EXPORT NUMBER

EDITORIAL INDEX—PAGE 266.
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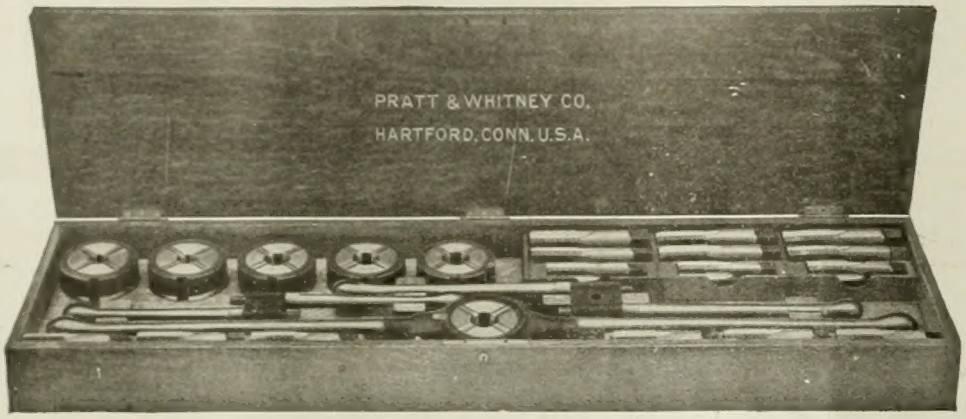
CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
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Vol. XXII., No. 10. Publication Office: Toronto, September 4, 1919. Subscription Price $3.00 per year.

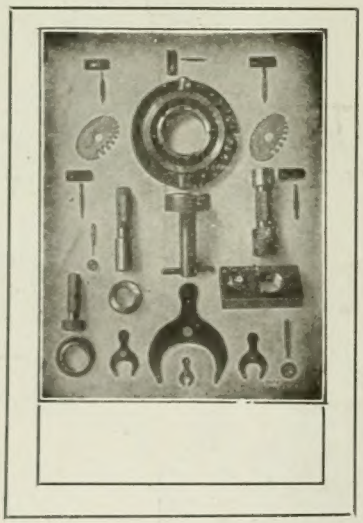


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P. & W. Die-Stock Set No. 4

These sets are furnished in various capacities for either U.S. Standard, S. A. E. Standard, Whitworth Standard or "V" Form. The Pratt & Whitney Policy of highest quality materials, together with the necessary refinement and accuracy, is maintained in all tools composing these sets.



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is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there today.

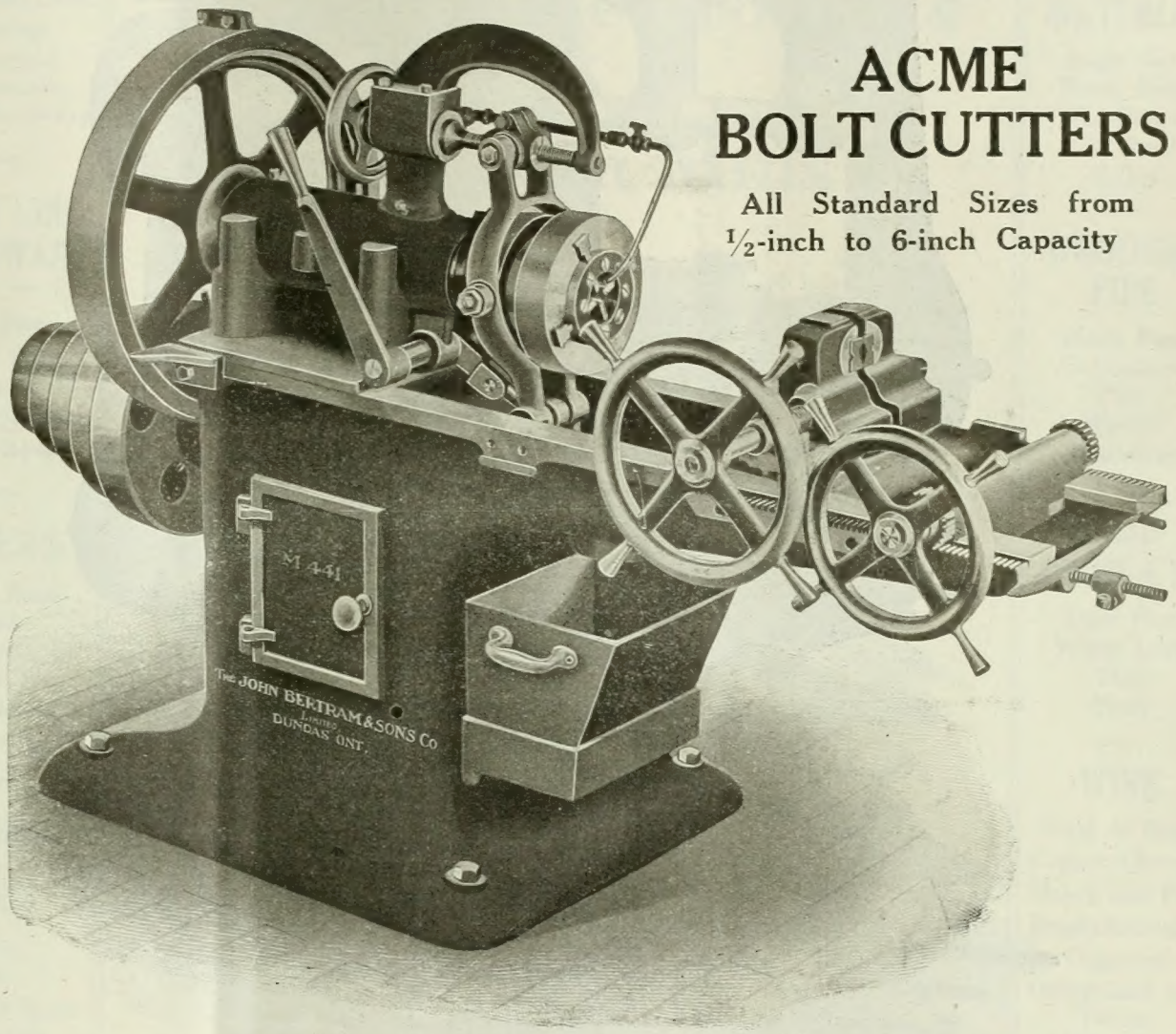
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ACME BOLT CUTTERS

All Standard Sizes from
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Supplied with Leadscrew Attachment for Stay Bolts or other work Requiring Special Accuracy or Pitch.

WRITE US FOR FULL DETAILS OF ANY MACHINE OR MACHINES IN WHICH YOU ARE INTERESTED

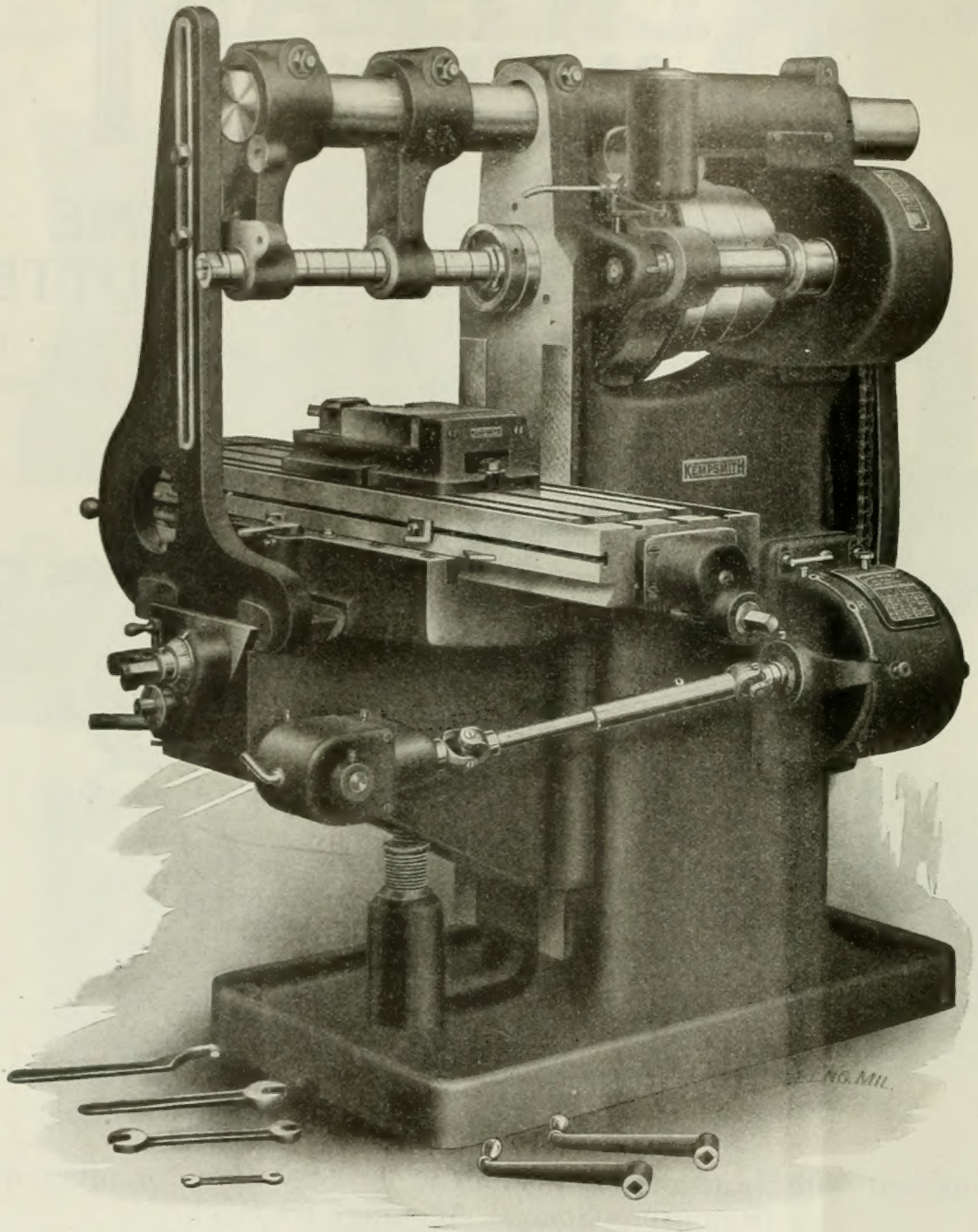
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Double Back Geared.

A heavy, powerful tool with double back gears and wide driving belt running on a three-step cone of large diameter. Our catalogue "B" describes and illustrates many notable features of the Kempsmith Miller. Write for a copy to-day.

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BY-PRODUCT COKE
SULPHATE of AMMONIA

"HAMILTON" PIG IRON

Basic Malleable Foundry

STEEL & IRON BARS
OPEN HEARTH
STEEL SHEETS

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Car Axles
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(Black and Galvanized)

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Cut
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Tacks
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Burrs

Purchase the Products of Canadian Mills

TO uphold the Glory we have jointly earned—to honor our noble dead—to comfort the wounded, and extend to the men returned the hand of prosperous welcome, we must cast aside all forebodings and face the future with unbounded courage and confidence and, without a shadow of doubt, declare to the World that this Nation, which was so quickly and successfully transformed to a War basis, can be depended upon to revert to Peace conditions with equal success. The buyer and seller must recognize their duty to the Nation and co-operate fully to the end that all products that can be produced in Canada by Canadian workmen shall not be purchased elsewhere.

OUR Duty is plain; Canada with Canadian labor and capital can produce, manufacture and distribute products sufficient to keep the wheels of industry turning to the limit. The song of Prosperity and Happiness should ring out all over the land. Let us sincerely pledge to the extent of our needs, to purchase materials produced in Canada by Canadian Workmen, and the result of our efforts will return to us the Blessings of a Prosperous and Happy Nation.

THE
STEEL COMPANY OF CANADA
LIMITED

HAMILTON MONTREAL

RAILROAD TRACK MATERIAL

Angle Bars
Track Bolts
Tie Plates
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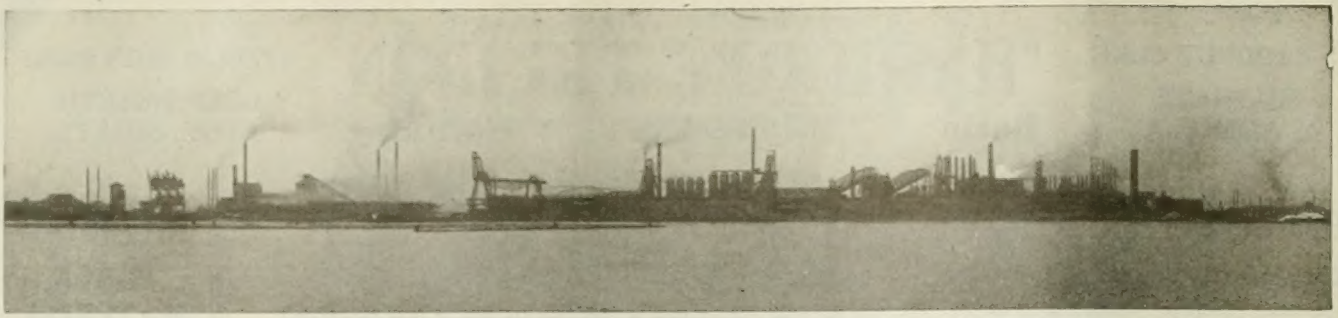
LEAD PRODUCTS

Lead Pipe
White Lead
Shot
Putty

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Steel & Brass
Copper & Bronze
Heavy and Fine
Bright Annealed
Coppered
Galvanized and Tinned
Stranded
Steel and Copper Cable
Clothes Line
Staples
Barb Wire
Woven Wire
Fencing
Fence Gates

Bars Blooms Billets
Wire Wire Rods Sheets Horse Shoes
Angles Channels Plow Beams



General View of the Plant of the Algoma Steel Corporation from the Waterfront.

ANNOUNCEMENT

THE ALGOMA STEEL CORPORATION, LIMITED, take pleasure in announcing to their customers and the Canadian trade that in accordance with the widespread desire throughout the Dominion that there should be obtained in Canada with Canadian labor, a much larger proportion of the requirements of this country in STEEL SECTIONS for STRUCTURAL PURPOSES, CAR CONSTRUCTION, SHIPBUILDERS' REQUIREMENTS, etc., they are just completing extensive alterations and additions to their rolling mills, and on or about 1ST NOVEMBER, will be ready to produce and ship American Standard Sections of BEAMS and CHANNELS up to and including 15", all standard sections of ANGLES from 6" x 6" down to 1¼" x 1¼", ZEE BARS for car builders and general purposes, small and large ROUNDS and SQUARES, and FLAT BARS up to 14" wide. The quality of the product is already well known to the trade, and is exclusively steel made by the Open Hearth process. and can be furnished in all grades from the softest rivet stock to high carbon special spring material. Motto: "Quality and Service."

MARK OF ALGOMA O.H. QUALITY

The following are the sections which will be rolled:—

ANGLES—Equal Leg—
6 x 6"—5 x 5"—4 x 4"
3½ x 3½"—3 x 3"
2½ x 2½"—2¼ x 2¼"
2 x 2"—1¾ x 1¾"
1½ x 1½"—1¼ x 1¼"

ANGLES—Unequal Leg—
6 x 4"—6 x 3½"—5 x 4"
5 x 3½"—5 x 3"—4½ x 3"
4 x 3½"—4 x 3"—3½ x 3"
3½ x 2½"—3 x 2½"—3 x 2"
2½ x 2"

BEAMS—
15", 12", 10", 8", 6", 5", 4", 3".

CHANNELS—
15", 13", 12", 10", 8", 6", 5", 4", 3".

ZEES—
3¼ x 5 x 3¼ x 5 x 5/16"
3 5/16 x 5 1/16 x 3 5/16 x ⅜"
3⅜ x 5⅛ x 3¾ x 7/16"
3 1/16 x 4 x 3 1/16 x ¼"
3⅛ x 4 1/16 x 3⅛ x 5/16"
3 3/16 x 4⅛ x 3 3/16 x ⅜"
2 11/16 x 3 x 2 11/16 x ¼"
2¾ x 3 1/16 x 2¾ x 5/16"

ROUNDS—
All sizes from ½" up to and including 4".

SQUARES—
All sizes from ½" up to and including 3".

FLATS—
All sizes from 1 x ¼" up to and including 14" wide.

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All sections from 12 lbs. up to and including 45 lbs. per yard.

PIG IRON—
Machine Cast Foundry, Malleable and Basic.

Sulphate of Ammonia.

NITRE CAKE.

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ALGOMA STEEL CORPORATION

SAULT STE. MARIE, ONTARIO

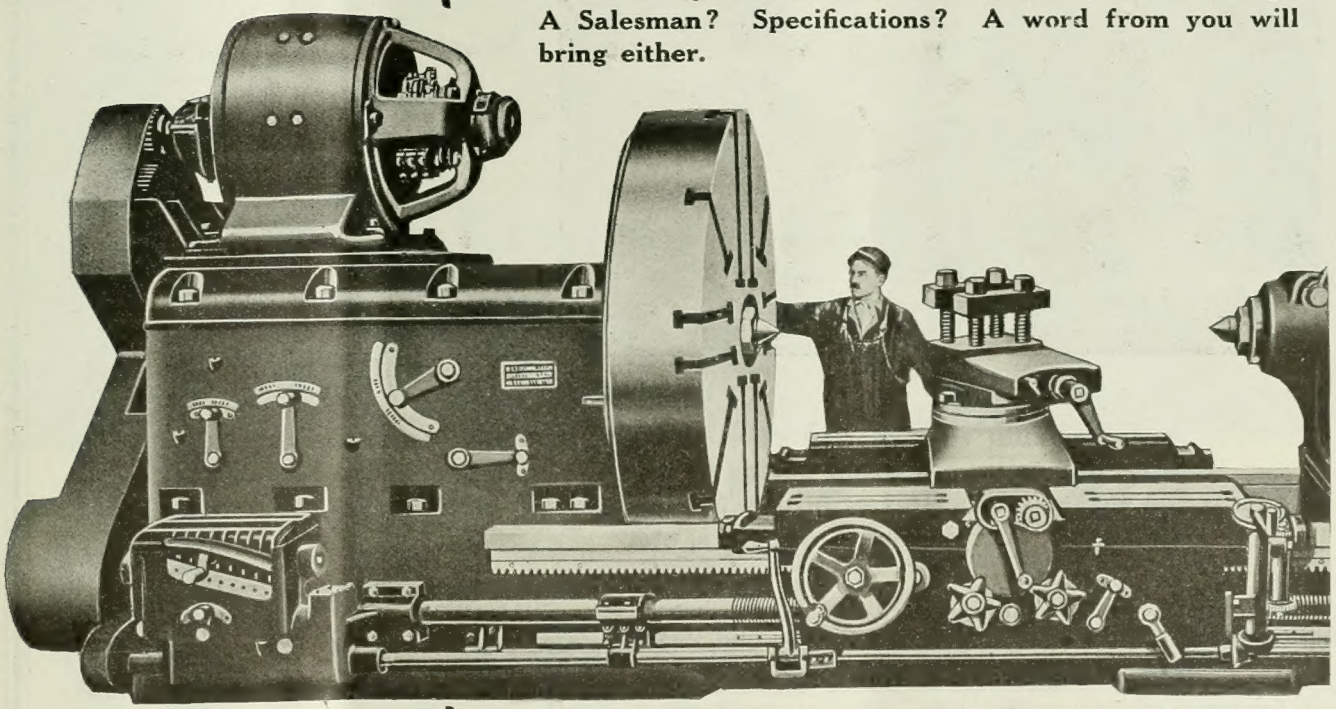
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You Can Rely on BRIDGEFORD Lathes

Pace setters for twenty years in the heavy duty lathe field, BRIDGEFORDS can be depended upon absolutely. It would be like painting the lily for us to use the word "best" in connection with BRIDGEFORDS, but we are prepared to show you how you can increase production with BRIDGEFORDS.

Baldwin and American, in the locomotive field—New York Central, Pennsylvania, Southern Pacific, Santa Fe, in the railroad field—Cambria, Standard Steel Car, Bethlehem Steel, Standard Oil, International Harvester—all of these names are on our customer list. They are only a few of the prominent ones, though.

Let us send you a list of installations near you. A Catalog? A Salesman? Specifications? A word from you will bring either.



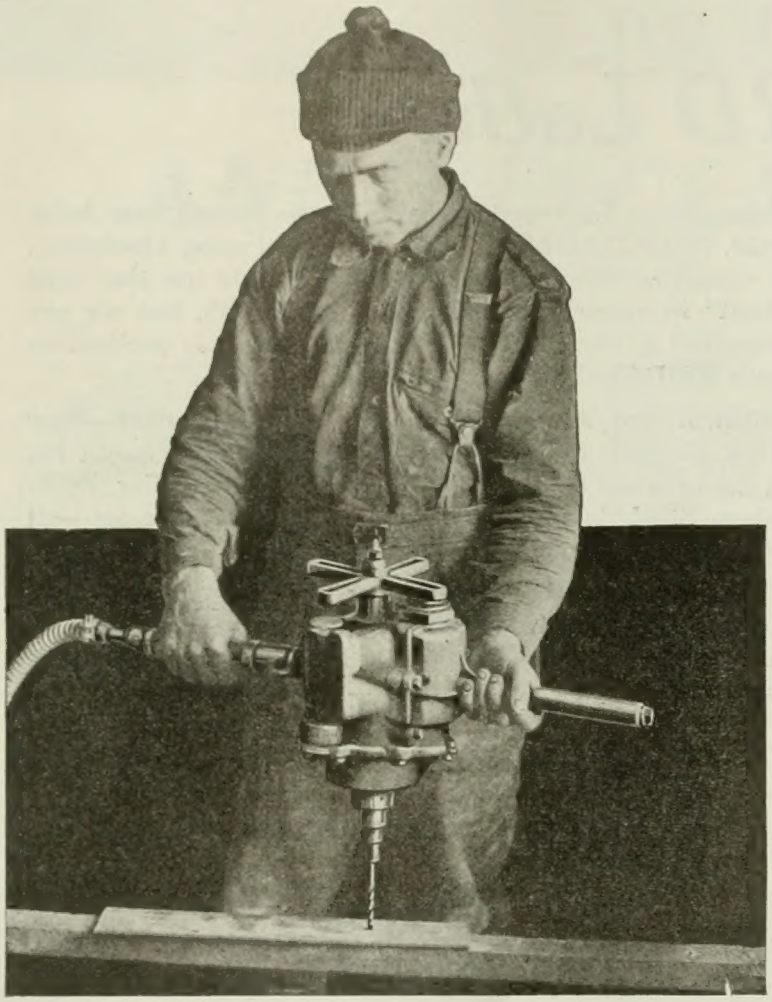
Makers of Heavy Duty Machine Tools Since 1861

BRIDGEFORD MACHINE TOOL WORKS

161 Winton Road Rochester, N.Y.

"LITTLE DAVID" PNEUMATIC DRILLS

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Economical
Speedy
Durable
Reliable

Ball and Roller Bearings

Drop Forged Gears (with cut teeth)

One Piece Connecting Rods

One Piece Gear Driven Rotary Valves

Simple and Accessible Construction

Completely Interchangeable Parts

Low Air Consumption for Power Delivered

Are desirable wherever there is portable drilling, reaming, tapping, flue rolling or wood boring to be done. They are also useful for valve setting and grinding, operating large gate valves, portable saws, boring bars, keyseaters, etc.

The "Little David" line embraces Reversible and Non-Reversible Drills, Close Corner Drills for drilling in cramped quarters, Wood Borers and Portable and Pedestal Grinders.

Catalogue 8607 describes "Little David" Drills in detail and contains some interesting information for users of pneumatic tools. May we send you a copy?

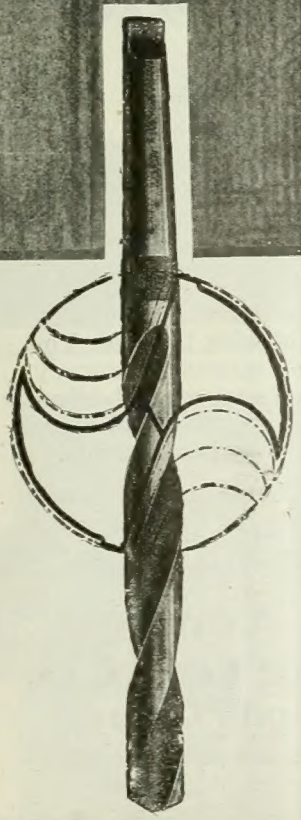
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Quality Tools a Vital Necessity

Where there's a WILT—There's the way

Equip your plant with modern tools of the best quality. It is the vital necessity of the day to Manufacturers. Competition of the present and in the future demands it.

For your drilling, reaming and milling cutter operations, choose *WILT High Speed and Carbon Drills, Reamers and Milling Cutters.* As compared with any ordinary tool they cut faster, more accurately, require less power, require less re-grinding and give longer service—and they cost no more than ordinary tools.

Put them to the test—you'll find them best

Wilt Twist Drill Company
OF CANADA, LIMITED

Walkerville - - Ontario

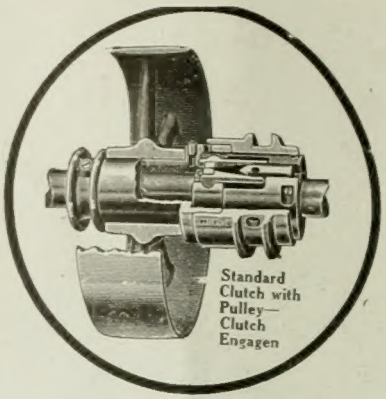
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Clutches That Fit the Job

Misfits are always annoying—in power transmission they are usually costly. There is no excuse for having your clutches either overpowered or underpowered. We know from our long experience just what Johnson clutches will do.

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The clutch of a thousand uses.

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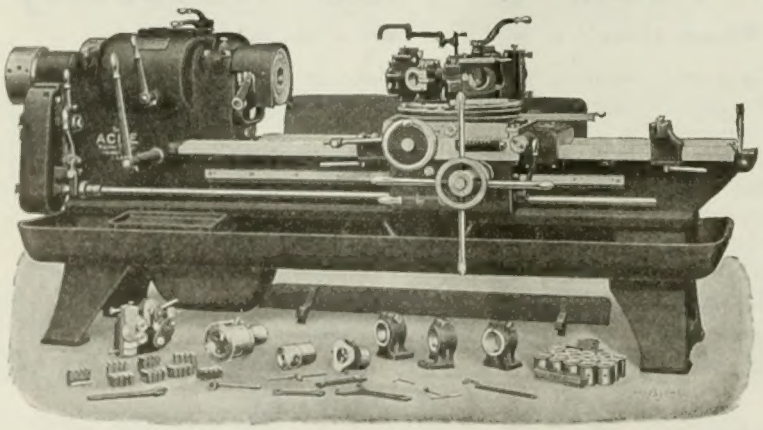
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Doubly Efficient—Does Both Bar and Chuck Work

This Cincinnati Acme Flat Turret Lathe is a double-production, geared head machine of the sliding gear type. It operates on minimum power because the only gears running are those doing the actual work.

This machine saves remarkable time and labor machining either bar work or chuck work up to 16 in. diameter.



3¼ in. x 36 in. Flat Turret Lathe, Equipped for Bar Work.

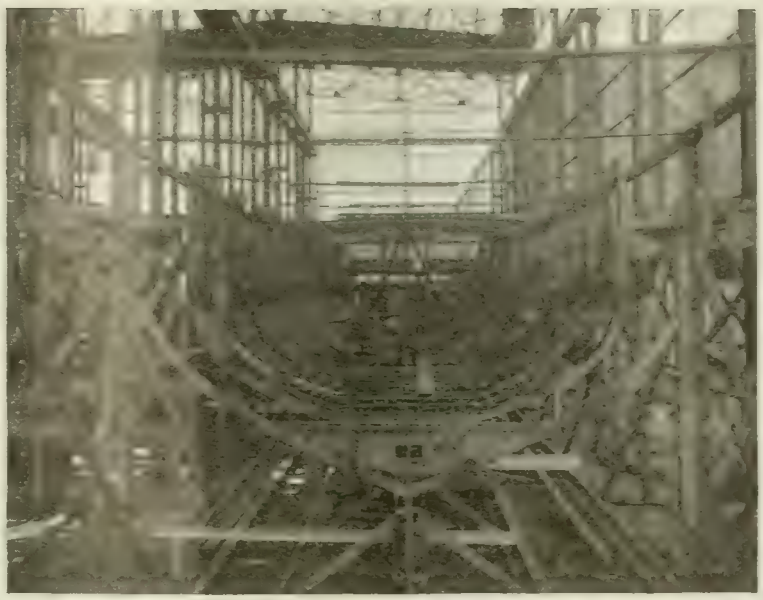
Head is cast solid with the bed. You know what that means: accuracy, rigidity, constant and perfect alignment of spindle with vees, upon which the turret carriage travels.

We also make a full line of Screw Machines and Turret Lathes.

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Canadian Agents: Rudel-Belnap Machinery Co., of Montreal and Toronto



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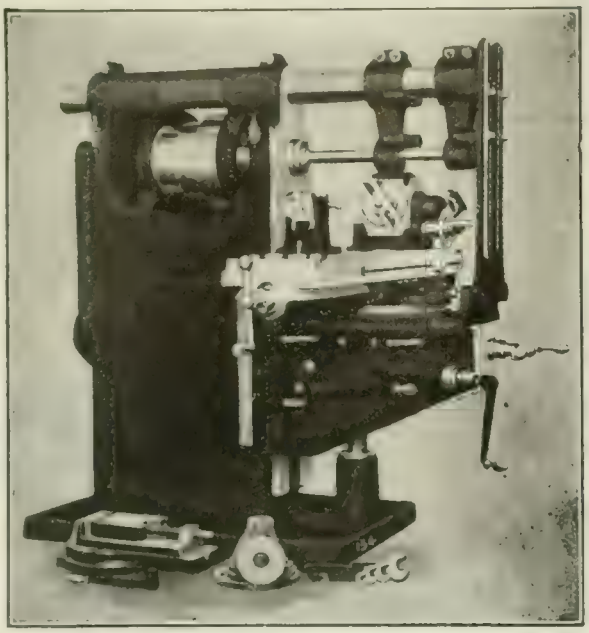
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FORD-SMITH MILLERS

Attachments



No. 2 Full Universal

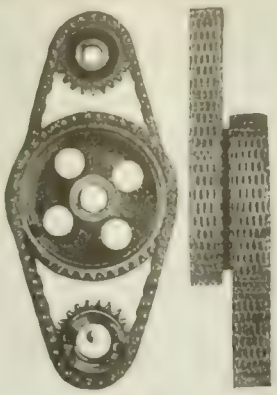
High productive service, efficiency, durability, thorough workmanship, best material and convenience in operation—all of these most necessary points are typical of Ford-Smith Milling Machines.

Superior standards in manufacturing coupled with rigid inspection of each detail of work guarantee accurate production and service.

Built by

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War Record Not Made Public

The "Whitney" Special Quality "Type M" Chains

made a great showing during the war years 1916-7 and 1918.

Our tests and demonstrations were made on prominent 8-cylinder motors in service on a large number of cars in the State of Connecticut.

During this long period not a single "Whitney" Chain or Sprocket had to be replaced and the condition of every Drive has been pronounced remarkable.

One Drive recently examined had given over 35,000 miles' service and both Chains and Sprockets were in such perfect condition that they appeared good for more than double that record (Sprockets having no adjustment).

The links of this SPECIAL CHAIN have finished faces and reamed holes, and the smooth faces do not damage the Sprocket teeth.

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Dunbar

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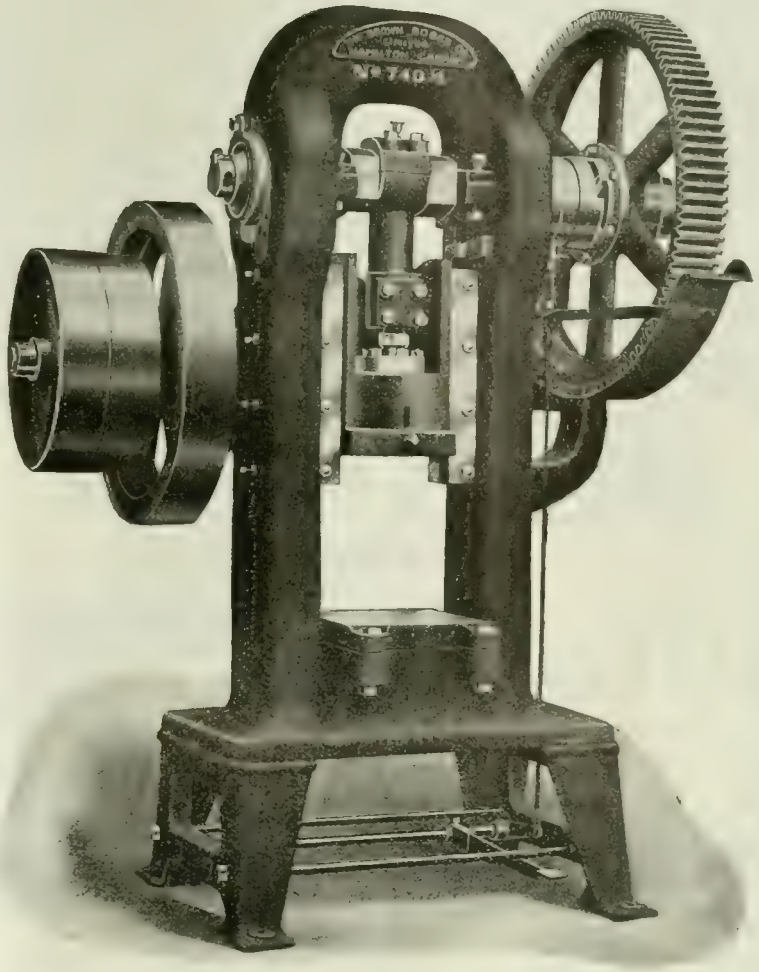
We have been making springs of all kinds for 70 years. Let us advise you when in difficulty.



Tell us the purpose for which the spring is intended, and our experts will gladly co-operate to see that you get the design best suited to the purpose.

Dunbar Springs are thoroughly tested for **accuracy** and **quality**. Send us specifications, for estimates.

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Something you do not get with second-hand equipment, yet in many cases it will offset the difference in price between the second-hand and new machine.

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A large stock of different sizes and styles of presses on hand for immediate shipment.

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BRANDS OF ALLOY & TOOL STEELS

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HIGH GRADE STEEL FOR ALL PURPOSES



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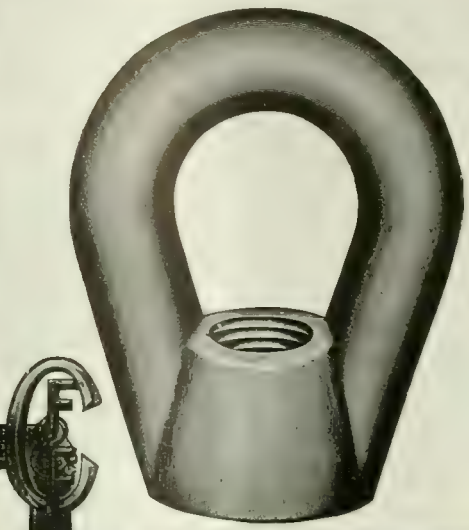
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all sizes

Produced at
Canadian Billings & Spencer Plant
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Crucible
AND
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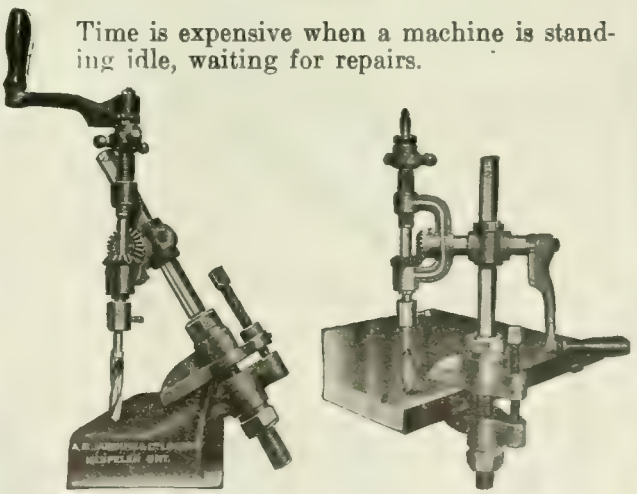
"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.
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Frankford, Phila.
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RALPH B. NORTON, AGENT
Montreal, Canada

Jardine Universal Ratchet Drill

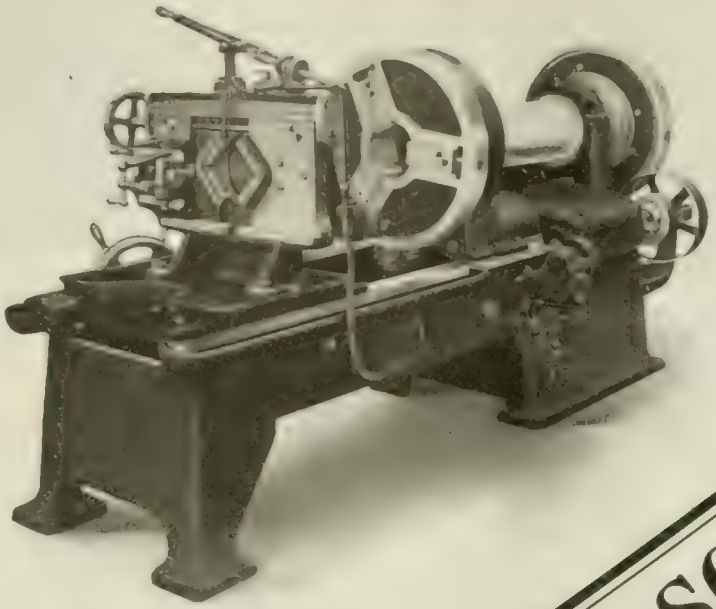
Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO



OUR SPECIALTY
PIPE MACHINERY

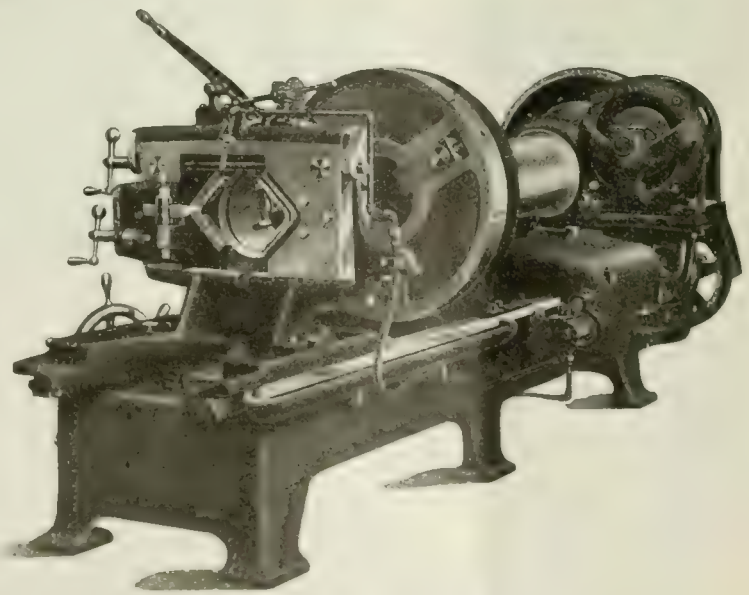
No. 6 Belt Drive
Capacity 1¼ to 6"
Built to
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JOHN H. HALL & SONS, LIMITED

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MANUFACTURERS OF

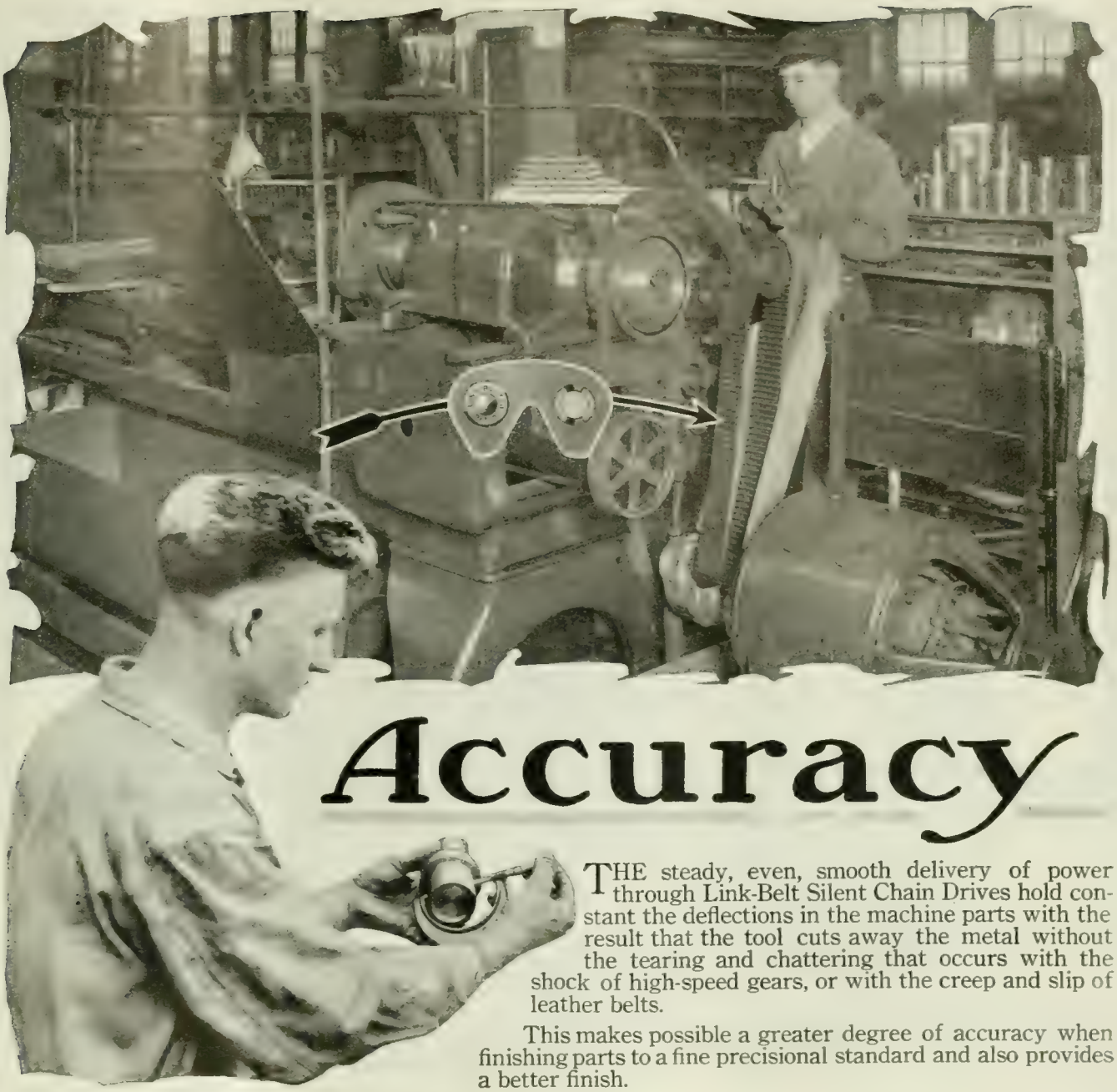
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Pipe Machines
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Roller Pipe Cutters



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Capacity 2½ to 8"

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Descriptive Bulletins
Just Issued



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LIMITED

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SILENT CHAIN DRIVES

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

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High Speed Steel

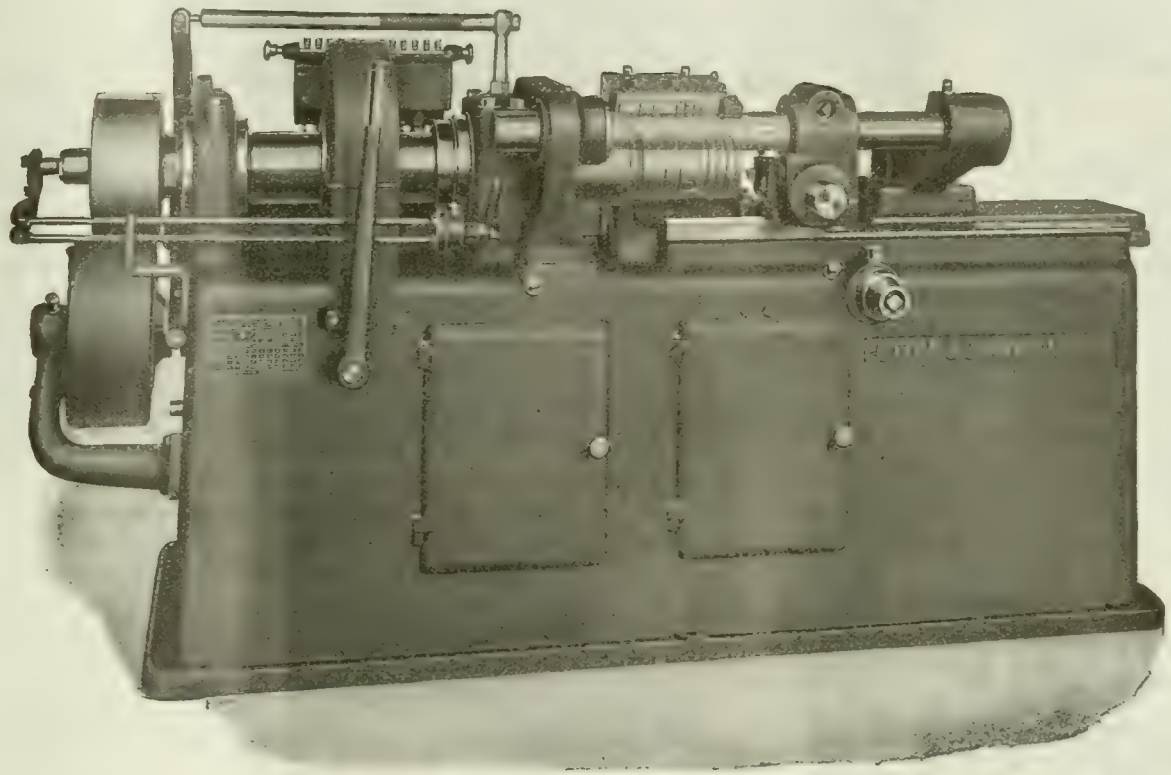
General Steel Company

Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

PISTONS AND PISTON RINGS MACHINED AUTOMATICALLY

Most Efficient. **Most Economical.**

One attendant operates two or three machines. Boring and turning tools piloted insures extreme accuracy and maximum output.



2P Combination Piston and Piston Ring Machine, showing method of automatically machining pistons, with air-operated drawback arbor, piloted turning tool holder, cross slide grooving and facing block. Over fifty machines installed by the largest Automobile builder in the world is a fitting testimonial as to the efficiency of the Automatic Piston and Piston Ring Machine. Let us have your drawings or samples for production estimate.

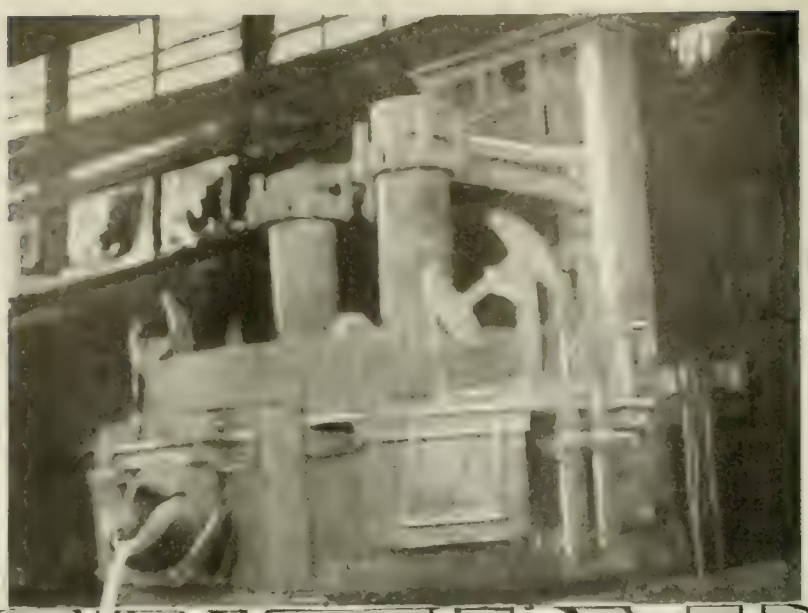
May we send you Bulletin 24?

Canadian Offices: POTTER & JOHNSTON MACHINE CO.

ROELOFSON MACHINE & TOOL CO., LIMITED

Head Office: 1501 Royal Bank Building, Toronto, Canada

Works and Warehouse: Galt, Ont., Canada.



ELECTRITE

High Speed Steel

SEVERAL factors combine to make this high-speed steel a triumph of the steel-maker's art; Electric Furnaces — entirely infallible, automatically regulated, delivering the same result time after time.

Uranium — This rare element, cousin to Radium, effects a profound change in the texture and quality of the steel.

Added to these, the constant care and skill of years of steel-making experience make the result of each melt a foregone conclusion.

Latrobe Electric Steel Co.

LATROBE, PENN.

URANIUM



"WACO"

HIGH SPEED STEEL

"WACO"
TRADE MARK

"DOUBLE WACO" 18% Tungsten, for Railway and Tramway Tires and Hard Metals
"WACO" 14% Tungsten, for Turning, Planing and Slotting Tools, Milling Cutters, Taps, Rimers, Twist Drills


TRADE MARK

CARBON TOOL STEELS
for
Engineers', Railway, Boilermakers', Shipbuilders', Miners and Blacksmiths' purposes in various qualities
Diamond Special Extra Best Quality Best Warranted
Warranted Ordinary
Each quality supplied in different tempers to suit tool required

DIE STEELS
for
Screwing Dies, Stamping Dies, Top and Bottom Nail Dies, Cartridge Dies, Mint Dies, Dies for Hot Stamping, Drawing Dies

COMBINED IRON AND STEEL
for
Beds, Dies, Machine Irons, Blades, etc.

MINERS' DRILL STEEL
In three qualities
Extra Special Special Ordinary

HOLLOW DRILL STEEL
Round or Octagon
Stainless Cutlery Steel Single or Double Shear Steel

SPECIAL MAGNET STEEL
Hammer and Wedge Steel, Scythe and Sickle Steel
"WACO" High Speed Twist Drills Carbon Twist Drills

MARSHALL, SON & BUNNEY
39 Richmond Street East TORONTO, ONT.

SOLE CANADIAN AGENTS FOR
WM. ATKINS & CO., LIMITED
SHEFFIELD - - ENGLAND

PRICES ON APPLICATION FOR IMPORT OR STOCK ORDERS

Vulcan Tool Steels

for Every Purpose

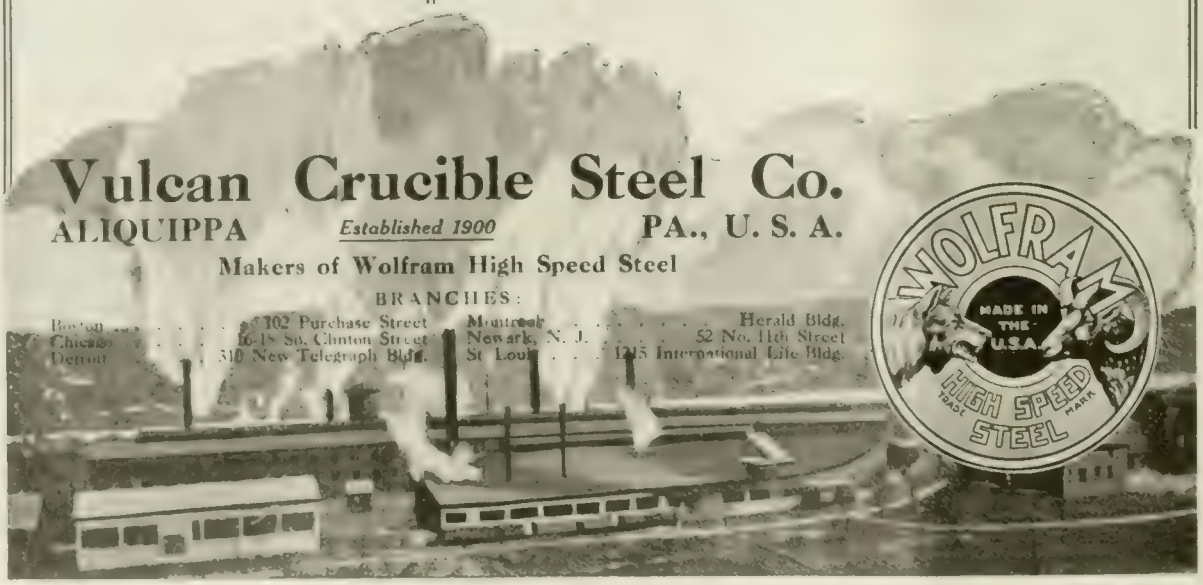
"You can't make a silk purse out of a sow's ear"

and we have never tried to.

The fact that we have been making the finest Tool Steels

SINCE 1900

at the same location and for a steadily increasing number of *Satisfied Customers* is the best evidence that *we will continue* to make *only the best steels.*



Vulcan Crucible Steel Co.

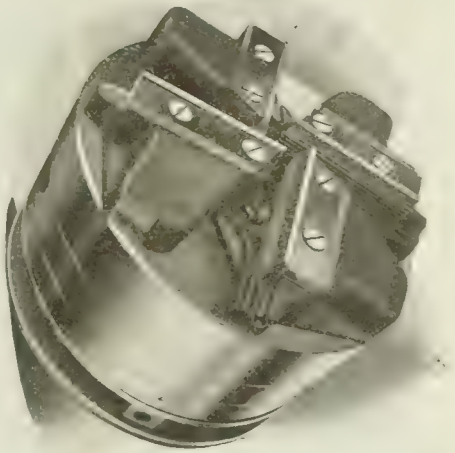
ALIQUIPPA *Established 1900* PA., U. S. A.

Makers of Wolfram High Speed Steel

BRANCHES:

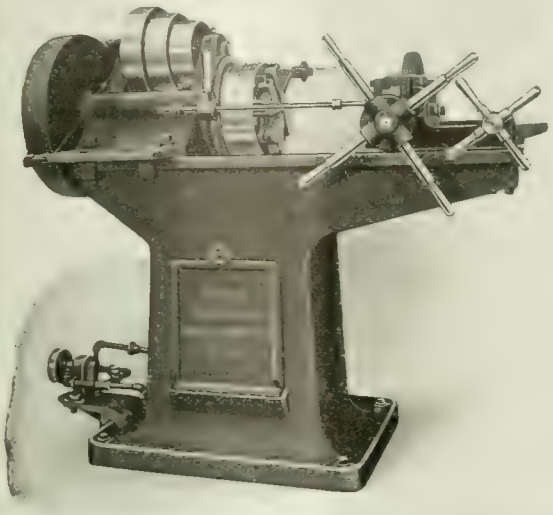
Boston	102 Purchase Street	Montreal	Herald Bldg.
Chicago	16-18 So. Clinton Street	Newark, N. J.	52 No. 11th Street
Detroit	310 New Telegraph Bldg.	St. Louis	1215 International Life Bldg.

"No Trouble to Make Them as Fine as Lathe Chased Threads"



said the user of Landis Threading Machines and this is not astonishing when you consider that the design of the Landis Die is but the combination of four lathe tools.

This design permits the chaser to be ground to suit the material being threaded whether it is iron, steel, brass, bronze, etc. In this manner an ideal cutting condition is obtained and the resulting threads cannot help but be accurate and well finished.



The chaser is tangentially disposed to the work and is located on a centre line. This means no drag, but instead a free cutting condition which permits of exceptionally high cutting speeds.

Apply the time-proven lathe tool principle to your threading by installing the Landis Die Head or Machine.

Details upon request.

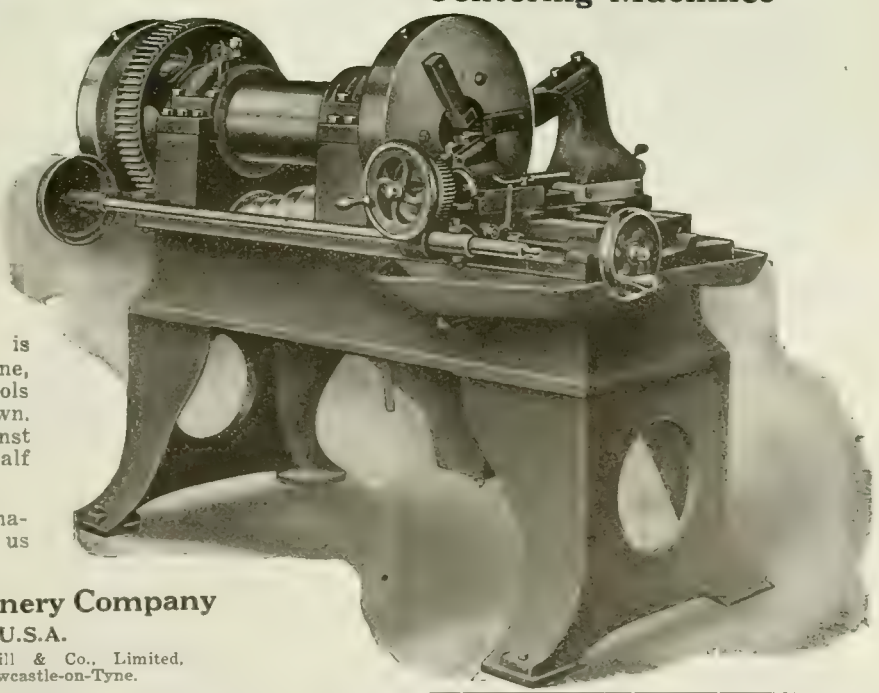
Landis Machine Company

Waynesboro, Pa.

Cut Your Cutting-off Costs in HALF

HURLBUT'S

Patent Cutting-off and Centering Machines



TO say that the Hurlbut, Rogers Cutting-Off and Centering Machine will **double your production** and **cut your costs in half** may seem like a broad claim. But this is just what this machine will do compared with any ordinary machine of its kind.

Hurlbut, Rogers speed and efficiency is easily explained. Instead of only one, it is equipped with two cutting-off tools —one cutting up and the other down. In this way they hold the work against each other and finish a job in just half the time and do twice the work.

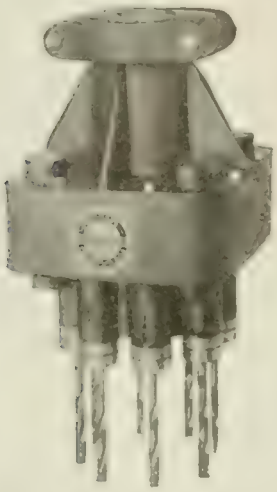
You can't afford to be without this machine. It saves real money. Let us tell you more about it. Write!

The Hurlbut, Rogers Machinery Company

South Sudbury, Mass., U.S.A.

Foreign Agents—England: Chas. Churchill & Co., Limited, London, Manchester, Glasgow and Newcastle-on-Tyne.

2 Minutes or 20?



This Is The Vital Question

Do you drill ten holes in the time it takes for one? The Hoefer Auxiliary Head equips any driller so as to accomplish this big saving in time. It speeds up production in drilling tremendously. Not only do you save the drilling time, but also the time now lost in shifting the jigs and raising and lowering the spindle for the extra holes.

Hoefer Auxiliary Heads are made in any multiple, arranged in any manner, from 2 up. They are made by expert tool makers and unqualifiedly guaranteed to handle accurately the work for which they are designed.

Investigate now—every day you use a single drill where the multiple may be used you are paying for an auxiliary head through increased costs, but not securing its benefits.

Write for catalog. Send a blueprint of some of your work for estimate of time cost.



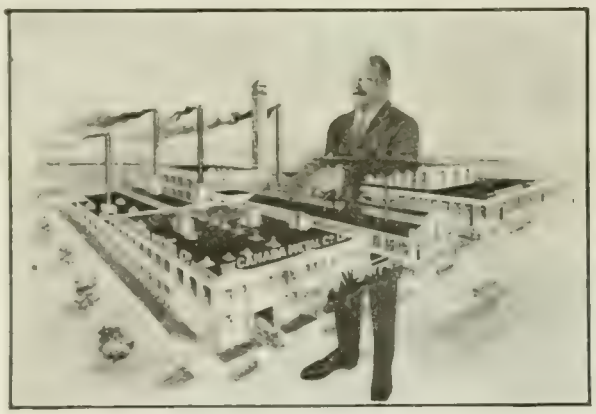
THE HOEFER Mfg. Co., Freeport, Ill.

621 Washington Blvd., Phone Haymarket 2408, Chicago, Illinois; 1113 Citizens' Bldg., Phone Main 795, Cleveland, Ohio; 708 Empire Building, Phone Court 1911 or 1912, Pittsburgh, Pa.; 602 Kerr Building, Phone Cherry 2884, Detroit, Mich.; 30 Church Street, Phone Cortland 1615, New York City; Badger-Packard Mchy. Co., Milwaukee, Wisconsin; National Supply Co., Toledo, Ohio.

The Canadian Fairbanks-Morse Co., Limited

"Canada's Departmental House For Mechanical Goods"

Halifax St. John Quebec Montreal Ottawa Toronto Hamilton Windsor Winnipeg Saskatoon Calgary Vancouver Victoria



IMPERIAL GENUINE BEARING METAL
For High Speed, Heavy Engine Bearings

HARRIS HEAVY PRESSURE
For General Machine Bearings.

ALUMINOID BEARING METAL
For Light Countershaft Work.

THE CANADA METAL COMPANY LIMITED
Toronto Montreal Winnipeg Vancouver

THE

TRADE K-A-T IE MARK

FOUNDRY
GALT - ONT.

Do Your Castings Cost Too Much?

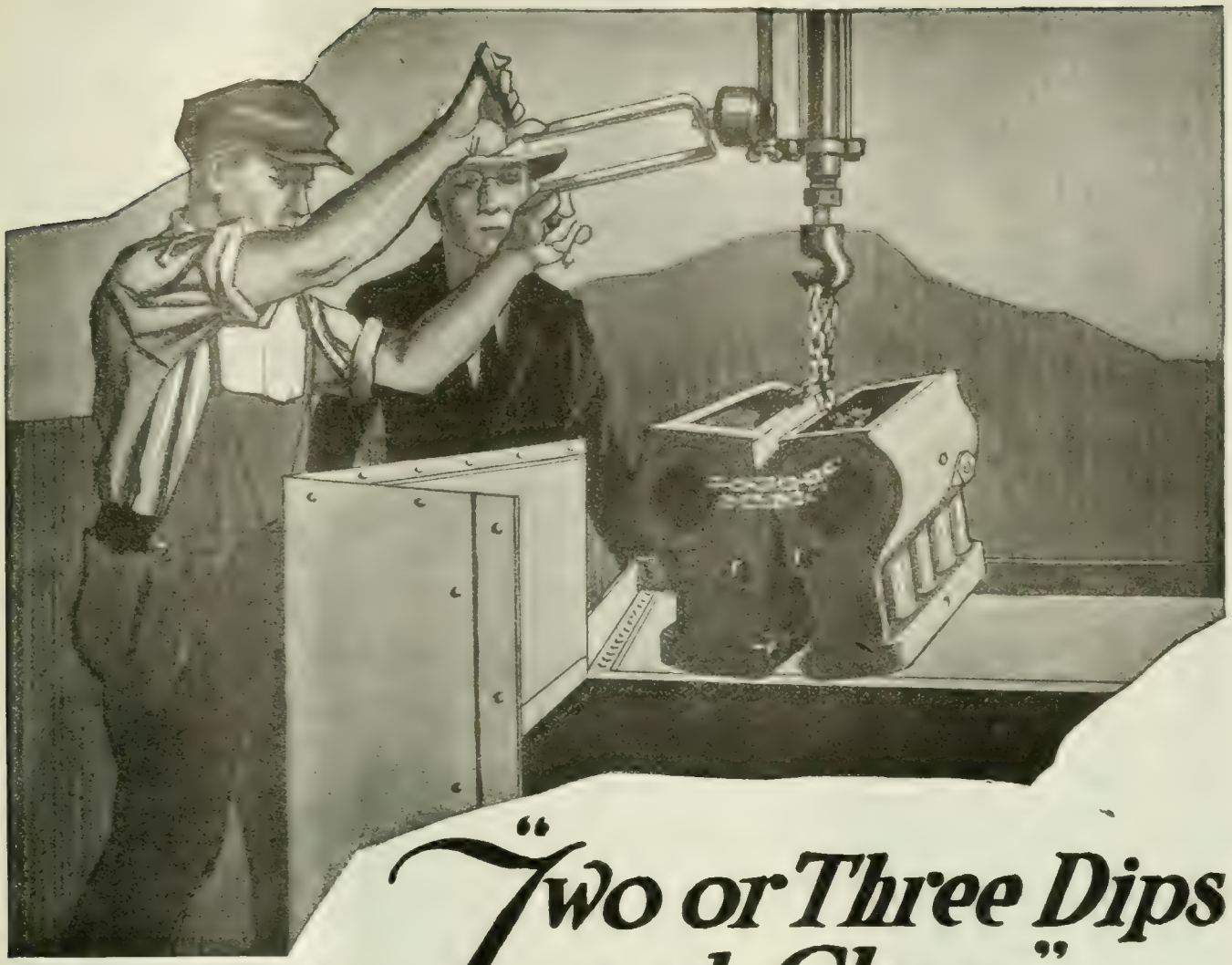
A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. We can advise you and we have expert metal and wood pattern-makers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.

We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

ASK US



"Two or Three Dips —and Clean"....

"Two or three dips in the Oakite cleaning tank, and the cylinder blocks are clean.

"We use 4 ounces of Oakite to the gallon of hot water for the cleaning solution.

"Oakite keeps the cleaning department on time. It speeds up the work—and the motor parts come through ***clean.***

"No more come-backs from the assembling room since we began using Oakite."

This Advertisement is one of a series based on actual occurrences

Correspondence invited.

OAKITE MANUFACTURED BY
OAKLEY CHEMICAL CO.
44 THAMES STREET · NEW YORK

Confidence

CLIPPER belt lacing has the confidence of American manufacturers. A complete list of Clipper users would include the leaders in every line of American industry. We are proud to be able to count among our customers the following nationally known manufacturers. It is needless to say that none of their plants lack anything that will make them efficient to the last degree.

Waste has been reduced to the minimum. The saving of time has been made the study of experts, with the result that they have adopted Clipper belt lacing.

It is not an exaggeration to assert that Clipper belt lacing predominates in all the manufacturing centers of the world.

American Agricultural Chemical Co.
American Radiator Co.
American Straw Board Co.
Baldwin Locomotive Works
Belding Bros. & Co.
Berkey & Gay Furniture Co.
Bissell Carpet Sweeper Co.
Buck's Stove & Range Co.
Chicago Pneumatic Tool Co.
Columbia Graphophone Co.
Continental Motors Corporation
H. J. Heinz Co.
Hoover Steel Ball Co.
Hyatt Roller Bearing Co.
International Harvester Co.
International Silver Co.
J. B. Williams Co.
Macbeth-Evans Glass Co.
Midvale Steel & Ordnance Co.
National Lead Co.
Neptune Twine & Cord Mills
Owens Bottle Machine Co.
Packard Motor Car Co.
R. J. Reynolds Tobacco Co.
The Aladdin Co.
The American Woolen Co.
Timken-Detroit Axle Co.
United Shoe Machinery Corp.
Westinghouse Electric & Mfg. Co.
Willys-Overland Co.
Winchester Repeating Arms Co.
Yale & Towne Manufacturing Co.

These names (only a single one selected from any industry) are used by permission. Hundreds of others, equally representative, in all industries, might be listed if space permitted.

The Clipper Belt Lacer
Laces a Belt in Three Minutes

Any machine workman can lace a belt with the Clipper. The low cost of the Clipper makes it possible to maintain Clipper equipment at convenient points around the plant.

The Clipper makes a durable joint—one that pulls better and is safer—is flush with the belt on both sides and is more flexible than the belt itself.

The Clipper goes to you for free trial. It is perpetually guaranteed where Clipper hooks are used. The American Museum of Safety gave the Clipper the only gold medal ever awarded for metal lacing. Use of the Clipper in your plant will solve effectively your belt lacing problems.

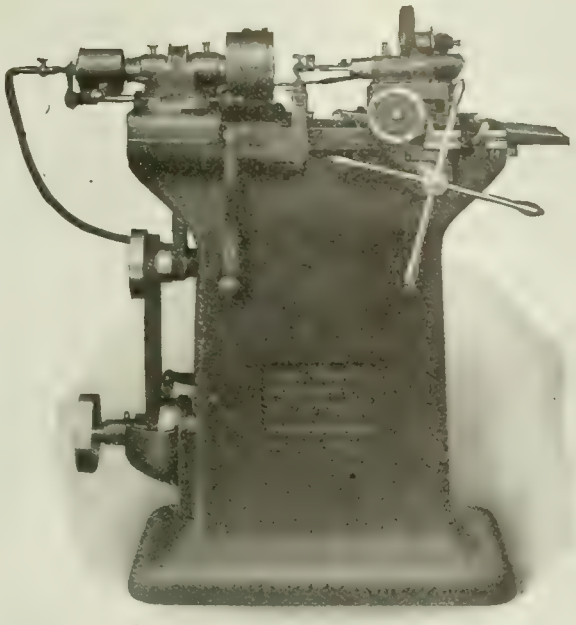
Some mill supply dealer in every city sells the Clipper

Clipper Belt Lacer Company

GRAND RAPIDS, MICHIGAN, U.S.A.

CAPACITY:

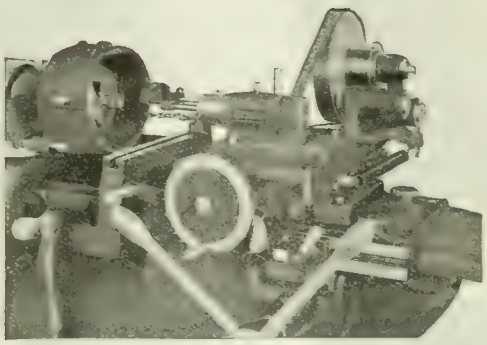
Grinds ¼″ to 2″ dia. x 4″ long.
Collet capacity ⅜″ to 3″ dia.
Swing 6″ dia. with water guard.
Swing 10″ dia. without water guard.
Diameter of workhead bearings 1⅝″ to 1⅞″ dia.
Net weight complete, 1,100 lbs.
Floor space 26″ x 50″.



FEATURES:

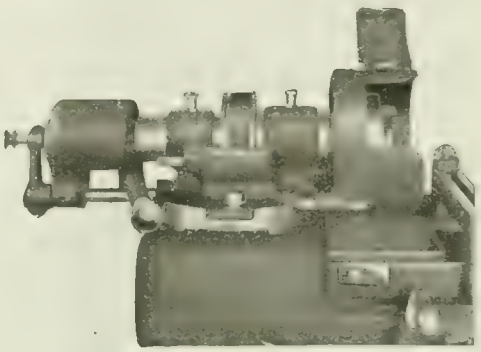
Automatic Brake for work.
Also stops flow of water.
Device for preventing distortion of work when chucking.
New Type 10 wheelhead.
Flexible idler—automatic wheel guard.
Positive stop for table.

FOR GRINDING SMALL SHORT WORK



New design type 10 wheel-head with flexible idler. This combination has proved unusually successful in giving finish and production.

NEW HEALD No. 85 INTERNAL GRINDER



Rigid workhead with massive bearings bolted directly to the base.
Lever which operates quick-acting collet.

A new spindle productive machine for small, short work. While it is simple to an extreme, the following features put it in a class by itself.

It is arranged so that movement of the pilot wheel to the right not only draws the wheel from the work, but automatically applies a brake, stopping the workhead and shutting off water supply.

The quick acting collet operated by a lever and which has a special adjustable compensating device against distortion of any thin work which is being held.

The table is provided with a positive stop accurately covering the travel, enabling the operator to grind up to a shoulder or any given point without danger of over-running. Lever for cross-feed of head is situated so it can be operated with the left hand while the right can still grasp the pilot wheel.

The machine is also equipped with flexible idler — automatic wheel guard — water attachments—and simple, single countershaft.

THE HEALD MACHINE COMPANY

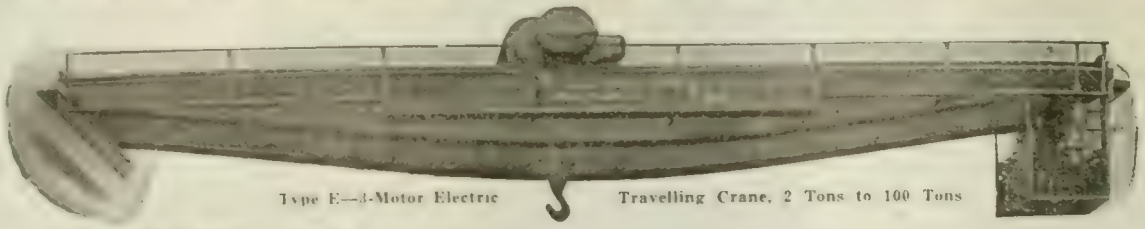
WORCESTER, MASS.

BRANCH OFFICES: New York, 839 Singer Bldg., Philadelphia, 1308 Commonwealth Bldg. Chicago, 26 South Jefferson St. Detroit, 401 Marquette Bldg. Cincinnati, 311 Provident Bank Bldg.. Cleveland, 721 Engineers Bldg. Western Agents: Eccles & Smith Co., Los Angeles, San Francisco and Portland. Salt Lake Hardware Co., Utah and Idaho.
FOREIGN AGENTS: Alfred Herbert, Ltd., England. Societe Anonyme, Alfred Herbert, France, Switzerland. Societa Anonima Italiana, Alfred Herbert, Italy. F. W. Horne Co., Japan. Wilh Sonesson & Co., Sweden, Denmark and Norway. Henri Benedictus, Brussels, Belgium. American Machinery Syndicate, Spain and Portugal.

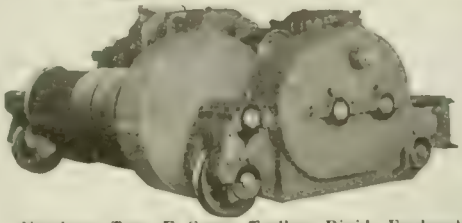
CANADIAN MADE

Electric and Hand Traveling Cranes

CANADIAN MADE

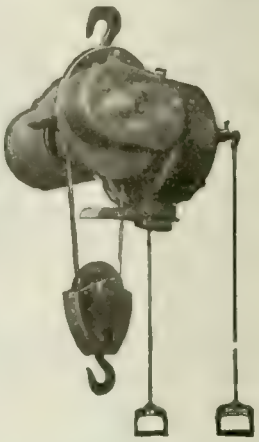


Type E—3-Motor Electric Travelling Crane, 2 Tons to 100 Tons

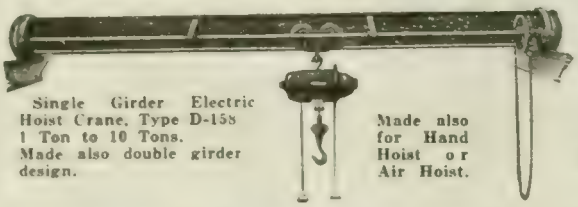


Northern Type E Crane Trolley, Rigid, Enclosed Construction. Patented in Canada.

We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.







Single Girder Electric Hoist Crane, Type D-158 1 Ton to 10 Tons. Made also double girder design.

Made also for Hand Hoist or Air Hoist.

Get our prices and specifications before you buy.

In asking prices, state SERVICE, CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

Catalogs free.

Type D Electric Hoists —½ to 10 Tons.

Air Hoists, Trolleys and Tracks.

Type No. 20 Air Hoist.

Northern Crane Works, Limited

Walkerville, Ontario, Canada

Swedish Steel & Importing Co., Limited

Montreal Toronto
New York Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS DOUBLE

PROMPT SHIPMENTS from large stock

NOVO SUPERIOR

HIGH SPEED STEEL
INTRA STEEL GIBRALTAR STEEL
Tool Steel for Every Purpose
Swedish Lancashire Iron

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc., Music Wire for Springs, Steel Balls. Cold Rolled Tool Steel in Strips and Sheets Circular Saws, Machine Knives.

PILOT STEEL & TOOL COMPANY, LIMITED

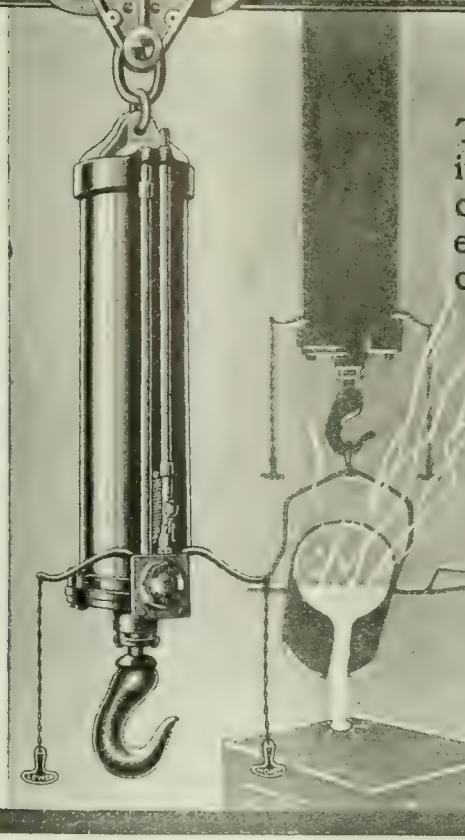
332 St. James Street, Montreal

Sole Agents for

JONAS & COLVER, LIMITED
Novo and Continental Steel Works, Sheffield, Eng

H. BOKER & CO., Inc.
New York, N.Y.

CURTIS *Air Hoists*



Economical—Safe—Dependable

The Curtis Air Hoist has been so perfected in its speed regulation, design and mechanical construction that it is the simplest, safest, most economical hoist for light and medium capacities. It effects a decided saving in man power.

A Hoist to Meet Your Needs

CURTIS AIR HOISTS have been successfully adapted to meet a wide variety of needs in hundreds of the leading industrial plants throughout America.

Our Engineering Department is at your service, ready to study any special conditions you have to meet and recommend suitable equipment. Illustrated descriptive literature and full information on request.

Curtis Pneumatic Machinery Co.
1585 Kienlen Ave., St. Louis, Mo.
Branch Office—532-A Hudson Terminal, N. Y. C.



"TALLMANS' SPECIAL" ARCTIC METAL

a medium-priced babbitt specially adapted for Saw Mill and Woodworking machinery.

Will remain cool under exceptionally high speed.

Its long life proves its efficiency.

Tallman Brass & Metal Limited
HAMILTON, ONT.

DIAMOND TOOLS

FOR TRUEING GRINDING WHEELS

QUALITY SERVICE SATISFACTION

INDUSTRIAL GEMS

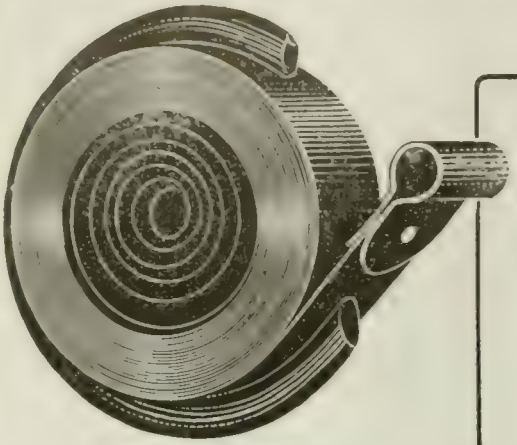
THE GENERAL SUPPLY COMPANY of CANADA, LIMITED

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VANCOUVER 906 Vancouver Block

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THE JOYCE-KOEBEL COMPANY, INC.
Formerly Geo. A. Joyce Co. Ltd.
NEW YORK LONDON

The Wallace Barnes Company



"Barnes made for every trade"

SPRINGS, WIRE & STEEL — EST. — "BARNES-MADE" PRODUCTS — 1857 — SCREW MACHINE PRODUCTS

A "Quality" Department

in which the customer's interests are safeguarded. A unique feature of our organization.

In this department is the record of every order, with full specifications and recommendations.

Throughout the entire time that an order is being filled, the Quality Department keeps up a rigid inspection, assuring the complete fulfillment of every order in every detail. "Barnes Made" Springs are consequently the realization of the buyer's exact requirements.

ESTABLISHED 1857

THE WALLACE BARNES COMPANY.

FLAT AND WIRE **SPRINGS** OF EVERY TYPE

SCREW MACHINE PRODUCTS - HIGH CARBON COLD ROLLED STEEL

MAIN OFFICE AND WORKS. BRISTOL, CONN.

50 EAST 42ND ST. N.Y. CITY. BOOK BUILDING. DETROIT. MICH.

Quality Dept.

Individuality

A GREAT MAN wrote this: "I'm called away by particular business, but I leave my character behind me." And nobody had to guess whose character it was. Even if the familiar Red Cut label should disappear there would be no doubt as to the character of the steel that remained. More than ever would the quality shine forth in the results when it was worked. Adherence to the highest standard with an unvarying uniformity has placed a well merited reputation all its own on

"Red Cut Superior"

THE NATIONALLY KNOWN - - FIRST QUALITY

HIGH SPEED STEEL

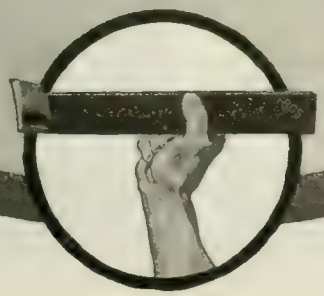
THE BEST FOR ALL MACHINE WORK

VANADIUM-ALLOYS STEEL CO.

General Sales Offices - - - - Pittsburgh, Pa.
Works - - Latrobe, Pa.

BRANCHES

BUFFALO
BOSTON
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DETROIT
TORONTO
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PITTSBURGH



RED-CUT SUPERIOR HIGH SPEED STEEL — VANADIUM ALLOYS STEEL CO. LATROBE, PA — TRADE "VASCO" MARK



CUT YOUR CUTTING COST WITH VICTOR Flexibles

The high cost of tools should emphasize more than ever the importance of quality.

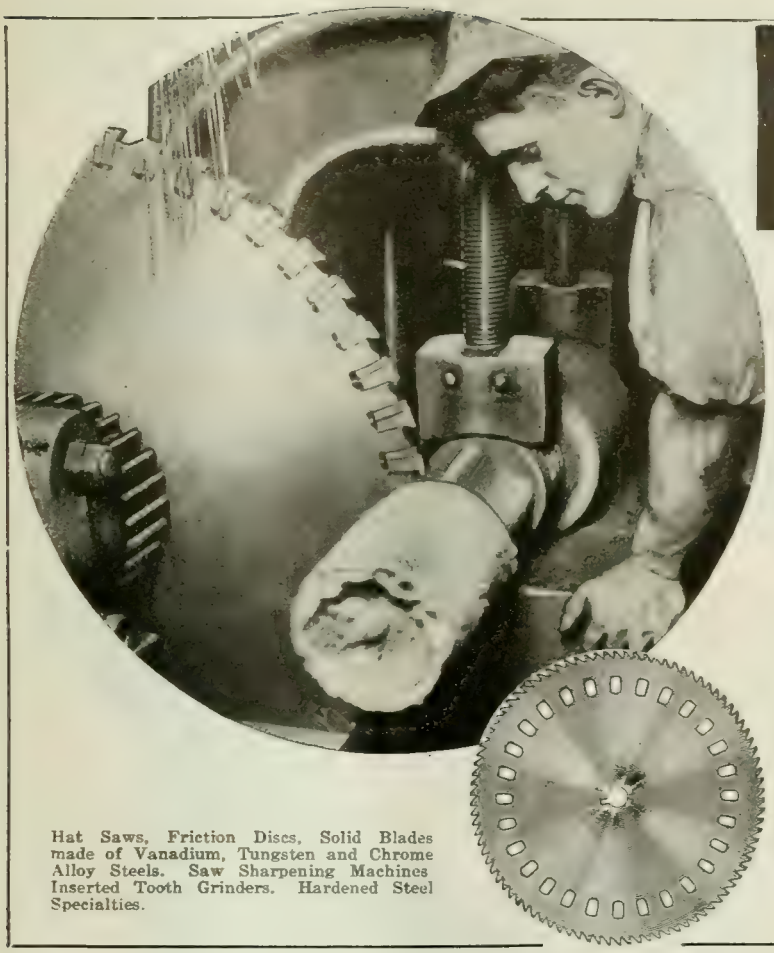
The high cost of hack saw blades ought to drive every hand blade user over to the saw that does not break in ordinary hand work.

VICTOR FLEXIBLE HACK SAW BLADES have exactly the same cutting power as the finest All-Hard on the market, and that they cannot be broken in use except by intentional abuse is an undisputable fact—which will represent a saving from twenty-five percent to thirty-three and one-third percent in breakage alone.

Seventy-five percent of the All-Hard blades used in hand frames break before they are worn out. Watch the All-Hard blades in your own shop and see the enormous amount of breakage—then use VICTOR FLEXIBLES and note the economy.

VICTOR SAW WORKS LTD - HAMILTON, CANADA





Hat Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines Inserted Tooth Grinders. Hardened Steel Specialties.

HUNTER
Duplex Saws

The selection of many of the best and largest companies in the country for cutting ingots, bars, forgings, castings, rails and structural shapes.

Their fast cutting qualities mean a saving of time and power, plus increased production.

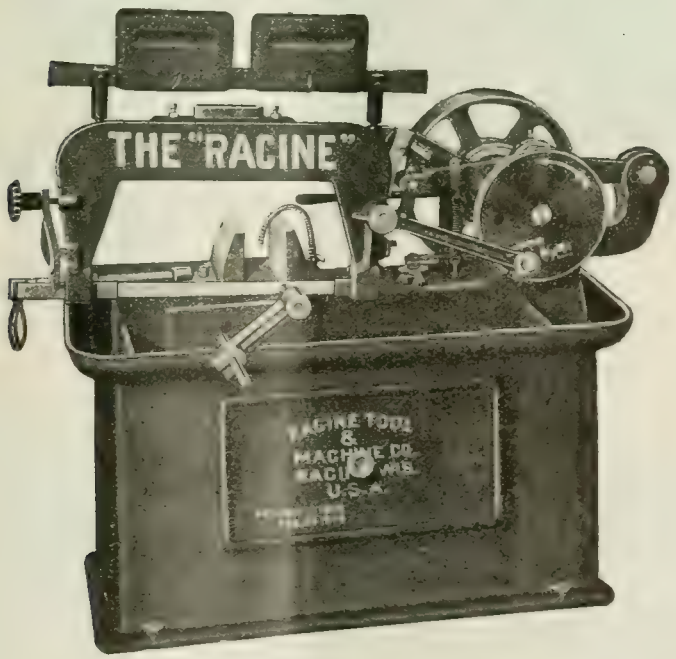
Teeth are accurately formed, ground and set for highest speed and greatest endurance. Made in sizes up to 90 in. in diameter.

Write for price list and full particulars

HUNTER SAW & MACHINE CO.
Pittsburgh, Pa.

Standard the World Over

"THE RACINE"



HIGH SPEED METAL CUTTING MACHINE

Reduces Blade Expense

Aside from its ability to turn out more work than any other metal cutting machine, "THE RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

There are many ways "THE RACINE" will prove a big saving. Let us tell them to you.

Use "Racine" H.S. Tungsten Power Blades

Racine Tool & Machine Co.
Melbourne Avenue - RACINE, WIS. U.S.A.

To cut down the cost per cut

A Matter of Teeth

The efficiency of a hack saw blade depends almost entirely upon the rake, the "set," and the pitch or number of teeth to the inch.

There's no overhanging "hook" to the teeth on a Starrett blade. With proper adjustment of weight or pressure, they'll cut just as fast on the last cut as on the first. The teeth are uniform in shape, "set" and spacing. That's why every blade in a box of Starrett saws cuts alike.

Starrett Hack Saws are made in varying pitches or number of teeth to the inch, from 10 to 32, according to the work they are intended for.

Different kinds and shapes of metal need different blades for economical cutting. Get Starrett blades, use them according to the Starrett Hack Saw Chart and watch your cost per cut decrease.

Write for Catalog 21-"3". It's free

THE L. S. STARRETT CO.
The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled
ATHOL, MASS.

the blade



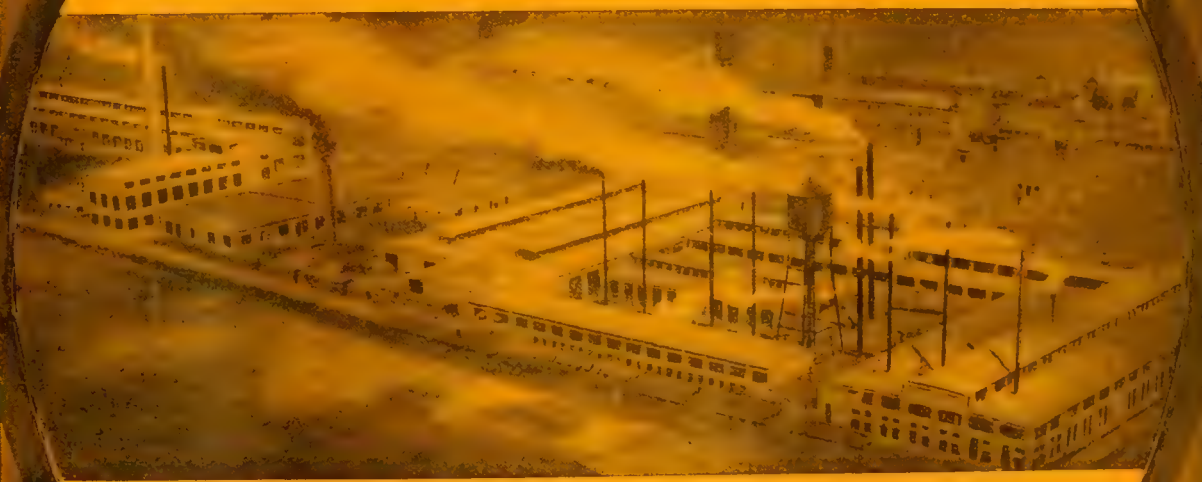
Use Starrett Hack Saw Blades



BROWN'S

Beaver Brand Metals

Copper, Brass, Bronze, Canada Silver, and Gilding Metal in sheets, rolls, plates and rods. Naval Bronze, Yellow Metal and Muntz Metal in sheets and rods for shipbuilding requirements. Specify Beaver Brass Rod for drilling and free cutting.



Link up with Beaver Brand Products—you'll like the quality, price and service.

Brown's Copper & Brass Rolling Mills, Limited

New Toronto, Ont., Can.

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

MALLEABLE AND CAST IRON PIPE FITTINGS

IM

The Brand That Has The Quality

"Quality" and "Reliability" are two essentials demanded of *Cast Iron* and *Malleable Fittings*, by all sanitary and heating engineers.

Time and money are lost by improperly made fittings. All our cast iron and malleable fittings are properly recessed and every fitting bears the above trade-mark of quality.

We make a complete and full line of both flanged and threaded fittings from ⅛-inch up, and can make deliveries from stock, both standard and extra heavy.

When ordering from your jobber be sure you buy—"the brand that has the quality." They are different. A trial order will convince.

International

Malleable Iron Company, Limited

Guelph, Ontario, Canada

A WALL RADIAL DRILL

That Puts Dollars in Your Pockets

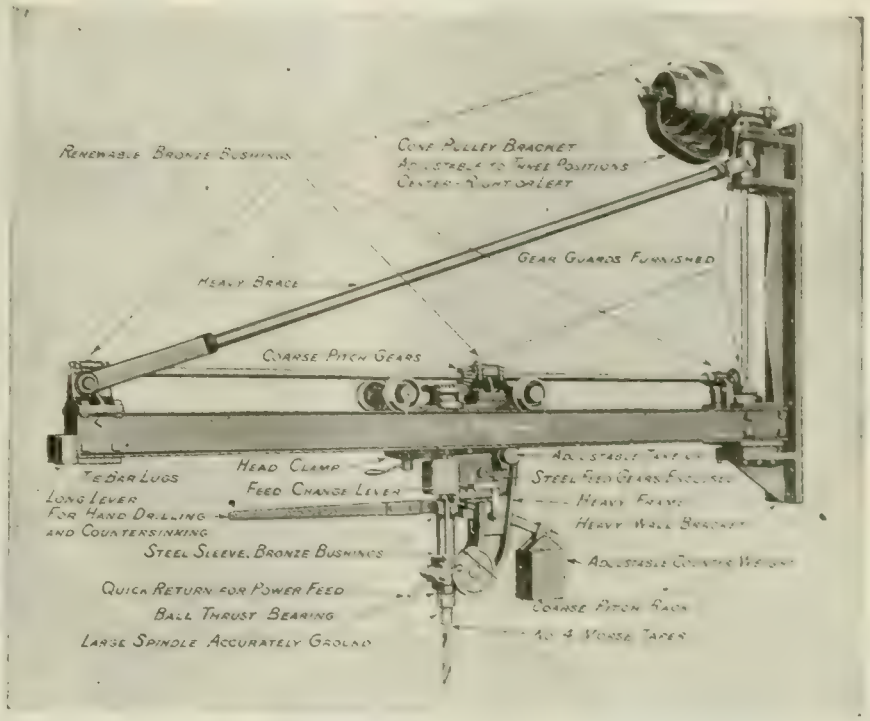
Here's a real machine tool in the wall radial drilling line for your consideration. Listen to this—the machine is made of high grade materials throughout, and the workmanship is beyond criticism. It is designed with the particular idea of maximum production, at a minimum operating expense. Entire control within easy reach makes the operators "boosters" for these machines. You can keep the dollars that may be slipping away on your wall radial drilling propositions in your pocket by the installation of this machine.

Send for Detailed Bulletin

MADE IN FOUR STANDARD SIZES.

Rated size	Drills to centre of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

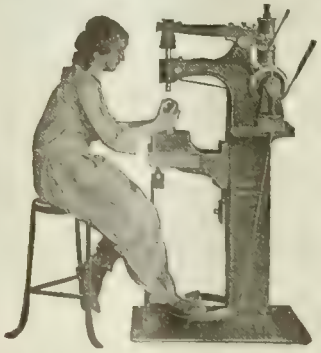
F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**

The Hammer With The Human Stroke



HEADS RIVETS COLD

Heads 'em tight or loose, flush, countersunk, or finishes heads any shape desired, and at the rate of:—

A rivet a second, sizes up to 3/16".
A rivet in two seconds, size ¼" to ⅜".
A rivet in three seconds, size 7/16" to ½".

And on special order we build machines to handle rivets up to 1½" with proportionate rapidity.

Built in eight sizes.

Besides riveting, the High Speed Riveting Hammer does all kinds of peining, swaging, upsetting, etc.

Send us sample assembly parts with rivets or sketch of your work,

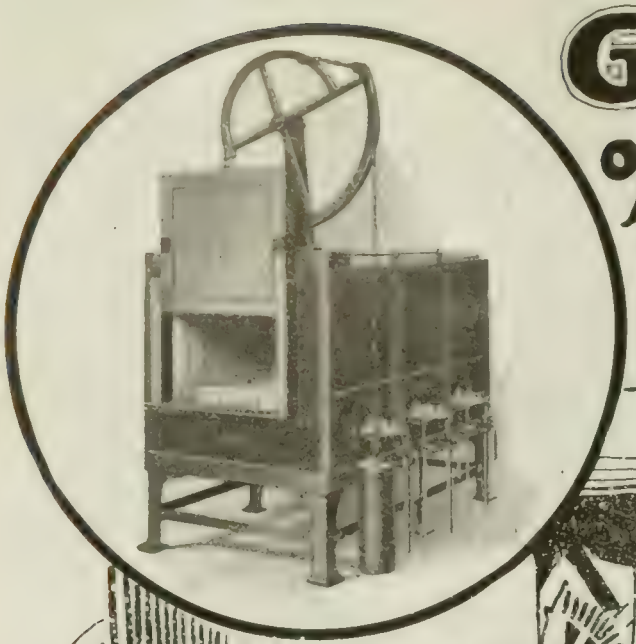
and

Let us shoulder your riveting problems.
Send for the High Speed Hammer Book.

THE HIGH SPEED HAMMER COMPANY, INC.
ROCHESTER, N.Y.



G&B Method of Heat-Treating



Gilbert & Barker Method the Right Method of Heat-Treating

Used by the Largest Manufacturers of Autos and Trucks.

Whether you manufacture tractors—automobiles —trucks—crankshafts—camshafts —tools—machine parts or anything else that requires heat-treating unless you have the **right** kind of heat-treating furnace for the purpose, you are defeating your own purpose, that of turning out a first-class product of uniform high quality.

GILBERT & BARKER FURNACES INSURE PERFECT COMBUSTION—ABSOLUTE TEMPERATURE CONTROL UNIFORMITY OF HEAT

the result of which is an exceptionally high grade product which measures up to the best manufacturing standards. There is a G. & B. Furnace exactly suited to your requirements. Let our engineers advise you—write. **To-day is a better day than to-morrow to send for Bulletin 24.**

Gilbert & Barker Manufacturing Company

17 Union Street Springfield, Mass.

ESTABLISHED 1865

New York Office: 26 Broadway. Canadian Agents: Williams & Wilson, Limited, Montreal, Que.

SAVED

In number of cutters used..... 66 2/3%
In take-down time..... 66 2/3%
In grinding time..... 66 2/3%
In setting-up time..... 66 2/3%

This is the record in another competitive performance of

DAVIDSONIZED HIGH SPEED STEEL TOOLS

Here are the facts as stated by the user of the tools, one of the best known big production plants (name on request):

"Up to the 12th of this month, there have been milled with these cutters 4,296 pcs., and the cutters are still in good condition.

"In competition we have so far used three other pair of different make cutters, all of which it was necessary for us to replace.

"We certainly are gratified at the wonderful performance of your cutters."

What It Means

On the face of it, a cutter which will outlast three others on the same work is worth three times as much.

But this is only a fraction of the advantage gained by this shop through the use of DAVIDSONIZED Cutters. Here are the other important items:

Increased production through gain of two-thirds the time formerly devoted to take-down and setting-up.

Reduction of overhead per piece through increased production.

Saving in labor item through reduction of grinding time.

Gain in good-will through better deliveries.

You, too, can save on all of these items by changing to Davidsonized Tools. The actual amount of saving will vary according to the nature of your work, but it will be big enough to interest you, whatever the conditions. Write for further particulars or ask for a representative to call.

The Davidson Tool Mfg. Corporation

Main Office: 118-122 Maiden Lane, New York
Works: 56-62 North 6th Street, Brooklyn, N.Y.

Canadian Fairbanks-Morse Co., Limited—Montreal, Toronto, Winnipeg

Aktiebolaget A. Bonthron, Stockholm, Sweden

Special Service
To Concerns Who Make Their Own Tools

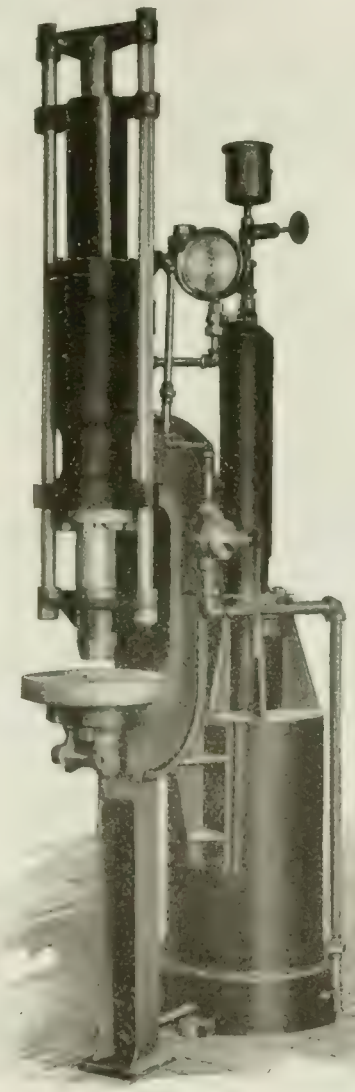
We will supply Davidsonized High Speed Steel Blanks, semi-finished to within approximately .015 to .020, either soft annealed or hardened.

ORIGINALITY

is Characteristic Always of

"METALWOOD"

DESIGNS and
DEVELOPMENTS



The "Metalwood" line of these Quick Operating Hydro-Pneumatic Presses comprises a variety of styles, types and sizes.

By performance through a period of years, these presses have established themselves in a wide range of industries as standard tools for light straightening, broaching, forcing and assembly operations.

The "R-149" style press of 20-ton capacity shown here is described in our bulletin B-47.

METALWOOD MANUFACTURING CO.

High Speed Hydraulic and Hydro-Pneumatic Machinery

DETROIT, MICHIGAN

EXCLUSIVE SALES REPRESENTATIVES:

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

THERE IS "A REASON WHY"

When Germany signed the Armistice, Walcott Lathe Company accepted cancellations of orders for Lathes amounting to hundreds of thousands of dollars. Not one cent of damage from the United States Government or anyone else was claimed on account of the cancellation.

YOU SAY, WHY

Because Walcott Lathes are standard equipment throughout. They are built and designed for manufacturing purposes in sizes to meet every requirement of your shop. Thus, we have had a constant increasing demand for Walcott Lathes for the past thirty-eight years, not from one section of the country, but from all over the world. Our business is good, and our plant is running full time, not a man idle.

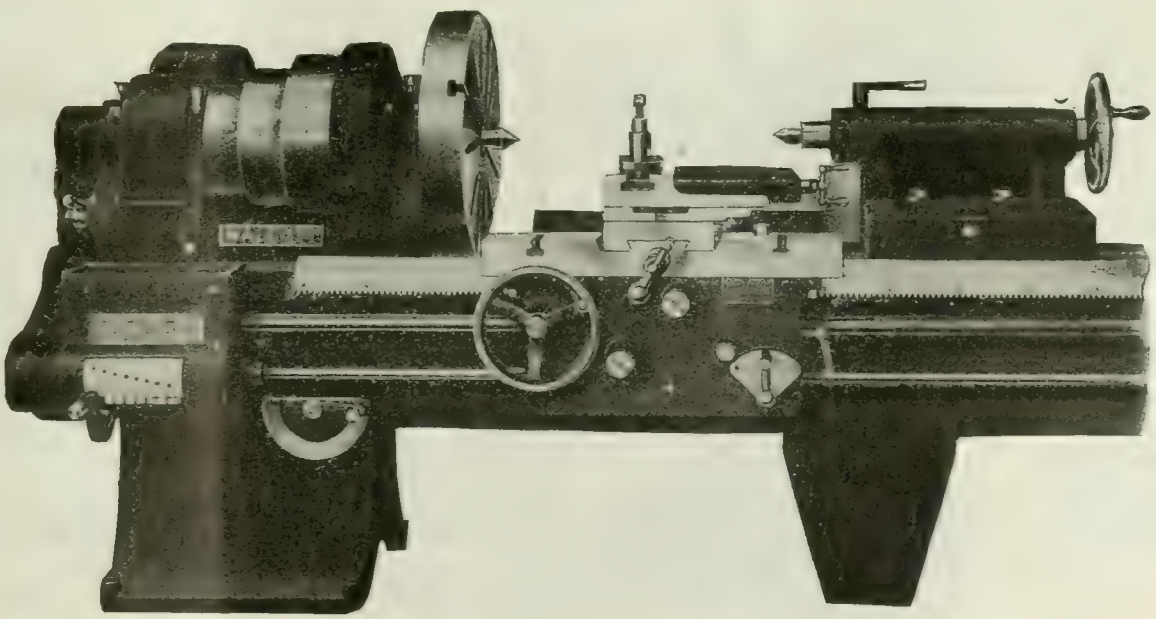
If you are interested in new Lathes, specify the WALCOTT, and you will find by their many advantages "The Reason Why."

WALCOTT LATHE COMPANY

Engine Lathes

140 Calhoun Street - JACKSON, MICHIGAN

AGENTS:—Hill, Clark & Co., Chicago, Ill. Frevert Machinery Co., New York City, N.Y. W. E. Shipley Machy. Co., Philadelphia, Pa. National Supply Co., Toledo, Ohio. Motch & Merryweather Machinery Co., Pittsburgh. H. A. Smith Machinery Co., Syracuse, N.Y. Wm. E. Duff, York, Pa. Wm. E. Duff, Jacksonville, Fla. Brown-McDonald Machy. Co., St. Louis, Mo. Smith-Booth-Usher Co., Los Angeles, Calif. Hendrie-Bolthoff Mfg. Co. & Sup. Co., Denver, Col. Gordon & Finkbeiner, Portland, Ore. Northern Machinery Co., Minneapolis, Minn. Brownell Machinery Co., Providence, R.I. Chas. A. Strelinger Co., Detroit, Mich. Marshall & Huschart Machinery Co., Indianapolis, Ind. Fenwick, Freres & Co., Paris, France. Buck & Hickman, Ltd., London, England. Parke & Lasey Co., Sydney, N.S.W. Standard Machy. & Supplies, Ltd., Montreal, Que. Canadian Fairbanks-Morse Co., Ltd., Toronto, Ont.

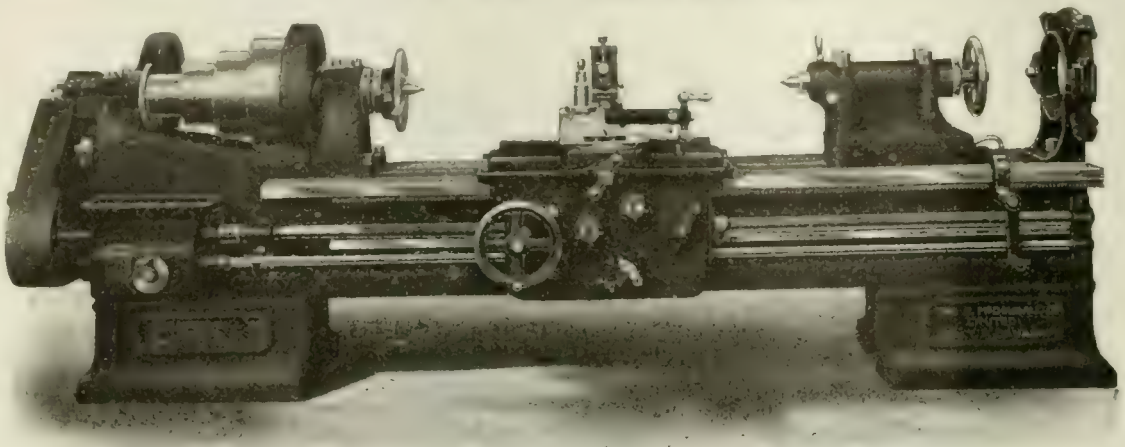


ARE-MAC-DEE IS A GUARANTEE

Every part of our Gap Lathes bears the "earmarks" of expert workmanship.

McDOUGALL GAP LATHES

And every feature is proof of our aim to produce a machine of unusual merit.



Ask us to send you descriptive literature

THE R. McDOUGALL COMPANY, LIMITED, GALT, ONTARIO
The Canadian Fairbanks-Morse Co., Limited, Sales Agents

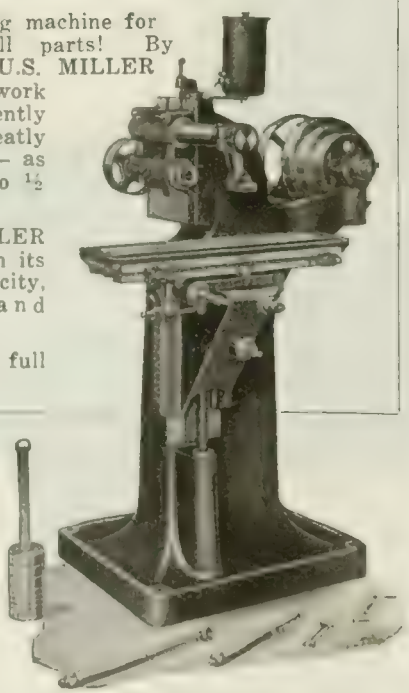
U.S. MILLER

Reduce Your Milling Costs ⅓ to ½

Don't use a big machine for milling small parts! By adopting the U.S. MILLER you can do the work just as efficiently and at a greatly reduced cost — as much as 1/3 to ½ lower.

The U.S. MILLER stands alone in its class for capacity, accuracy and speed.

Write for the full details.



United States Machine Tool Co.
CINCINNATI
Ohio U.S.A.

DF&SCo. Quality & Service

Forgings, Stampings or Pressed Steel Parts

An attractive catalogue showing the facilities this company has for producing Forgings, Stampings and Pressed Steel Parts—particularly in large quantities—sent on request.

Dominion Forge & Stamping Co., Ltd.
WALKERVILLE, ONTARIO
Toronto Office: 206 Excelsior Life Bldg.

Graton & Knight
Standardized Series
Leather Belting
Tanned by us for belting use

Triple Insurance

A Belt is a beast of burden that can spill a large part of its load without your eye perceiving it.

Here is a belt travelling at a speed of more than a mile a minute. It operates completely around the pulleys 70 times every 60 seconds. At more than a revolution per second, think how even little leaks would foot up a big total if this were not the proper belt for the work to be done.

All Graton & Knight Standardized Series Leather Belts give triple insurance against power leaks because, first, they are made of leather, the one belting material that has the right degree of elasticity to give and take up its tension, and the best of pulley-gripping qualities. Second, this leather is tanned in our own tannery, specifically for belting purposes. Third, our belts are graded into a Standardized Series which includes belts built specifically for every power transmission need. Each is standardized in its manufacture and standardized for its work.

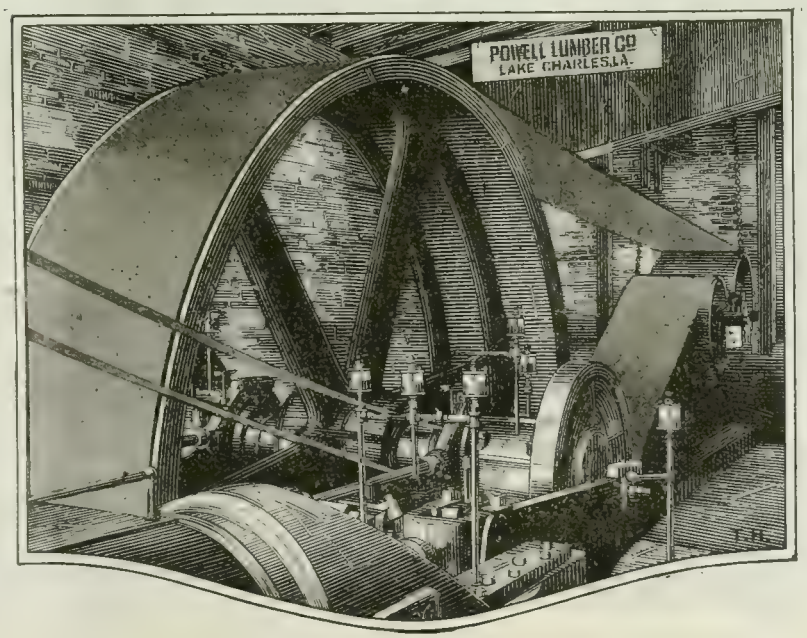
Selecting the proper belt and judging of its efficiency is not a job for guesswork or for the naked eye. It is a true engineering problem. Many of the best belted plants ask us to specify the belting for every pulley drive. Try the plan yourself. Then, when buying, call for "Graton & Knight——Brand or equal." This won't commit you to buying our belts. It will put your buying on the one basic consideration—the work to be done.

Write for Book, "Standardized Leather Belting"

CANADIAN GRATON & KNIGHT, LTD.
Montreal, Canada

Canadian Representatives: The Canadian Fairbanks-Morse Co., Ltd., St. John, Montreal, Ottawa, Toronto, Hamilton, Quebec, Calgary, Saskatoon, Vancouver, Windsor, Winnipeg, Victoria

By means of standardized methods of grading and manufacture, together with extensive investigations in our Engineering Laboratory, our Engineers are able to specify the correct belt for a given drive. Tests show that a 14 to 16 ounce belt should be rated at not more than 90% of the capacity of a 16 to 18 ounce belt. Consult our Engineering Department.



Here is a 34" Gra-Knight 3-ply Belt 82½ feet long. It was installed in December, 1915, in the plant of The Powell Lumber Co., Lake Charles, La. 14 ft. Drive Pulley, 136 R.P.M. 52" Driven Pulley. Belt Speed 5900 F. P. M. 443 horse power. The cost per horse power per week to date is 1 1/3 cents with several more years service to come.

Norton Grinding

No. 54A

SOME FINE POINTS IN GRINDING

IT HAS BEEN BROUGHT to our attention that many of our operators of grinding machines to-day neither realize the possibilities of grinding nor of what vital importance it is to treat both the machine and grinding wheel with care and "respect."

A machine using a very wide wheel, say 10 inches or 12 inches, must have great rigidity and at the same time be capable of producing refined work. Imagine the forces present when a wheel weighing 150 or 200 pounds revolves on a spindle in plain bearings at 1,000 to 1,200 revolutions per minute. There must be accuracy to keep this spindle in perfect alignment so that the face of the grinding wheel will produce an absolutely straight cylinder, and the weight required in the base of the machine and the wheel slide to absorb all vibration caused by the revolving mass must be ample. Another factor that must be borne in mind is the resistance which is offered when the wheel is brought in contact with the work, as small particles of a very hard material are removed at an extremely rapid rate. It has been calculated that on a wheel 24 inches diameter and 4 inches wide there are 1,860,171,000 cutting particles coming in contact with the work each minute. The spindle bearings must be so adjusted that the boxes will be quite hot when the machine is in operation; in fact, a temperature of about 140 degrees Fahrenheit is desirable.

Limits on the work being ground of .0005 inch are very common, those of .00025 inch quite common, and in some cases requirements are so exacting that less than .00025 inch is demanded. It should also be borne in mind that when the work is reduced .00025 inch on the diameter the massive slide carrying the wheel spindle and the grinding wheel moves forward only half of this distance; in other words, .000125 inch. If it were possible to split a piece of tissue paper into twelve thicknesses the thickness of one of the resulting pieces would represent the motion of the wheel slide when the grinding wheel removes .00025 inch from the work. Bear in mind that this accuracy must be maintained not only where very small cuts are taken, but also under conditions where the object is to grind off as many cubic inches per minute as possible.

NORTON COMPANY

Canadian Agents: The Canada Electric Machine Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria, J. H. Ardern & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

FOR THE FURNACE PLANTS: NIAGARA FALLS, N.Y. CHIPPAWA, ONT.

NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 1310 JEFFERSON ST.



Mark Your Products The "Matthews" Way

STEEL LETTERS AND FIGURES

In shops where the highest standards are maintained the stamping equipment is generally "Matthews Made."

Matthews Letters and Figures are hand made from carefully selected steel, heat treated for hardness, insuring long service under hard usage. They make deep, clean-cut impressions that outlast the product.

Mark your next order for steel lettering, dies or stamps—"Matthews Made."

Canadian Fairbanks-Morse Co., Limited

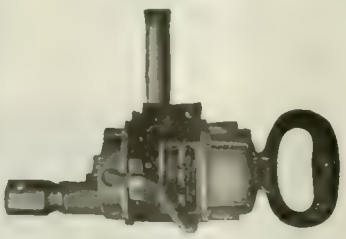
Montreal Toronto, St. John, Quebec, Ottawa, Hamilton Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

Jas. H. Matthews & Co. - Pittsburgh, Pa.

STEEL LETTERING DIES AND STAMPS

U. S. Electric Drills and Grinders

Save Time, Labor and Money



They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

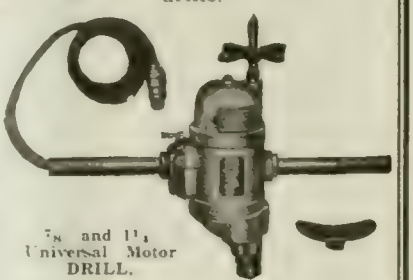
3 SIZES

3-16 in., W.G.T., 6 lbs.
¼ in., W.G.T. 9 lbs.
⅜ in., W.G.T. 12 lbs.

All motors wound for 110 or 220 volts

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



⅜ and ½ Universal Motor DRILL.

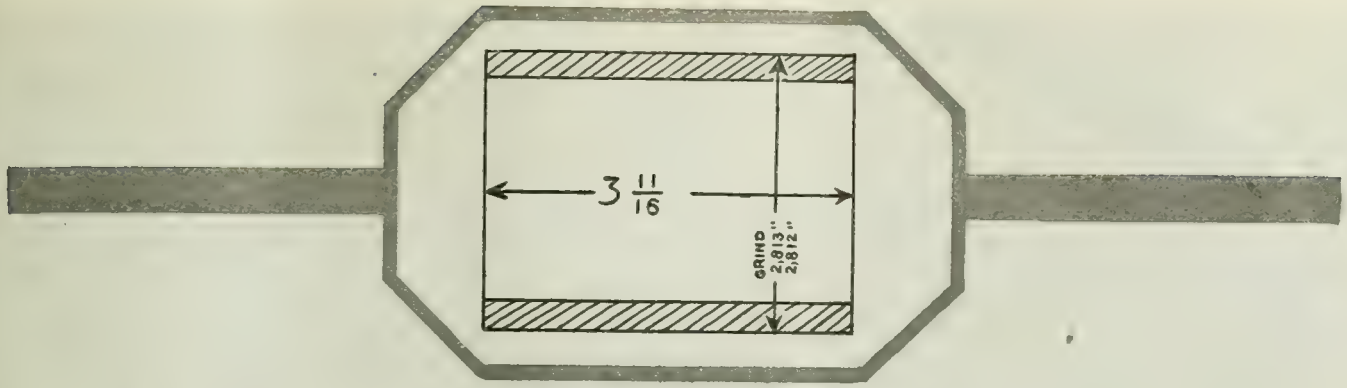
For Sale By

The Canadian Fairbanks-Morse Co., Limited

Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver

THE UNITED STATES ELECTRICAL TOOL CO.

CINCINNATI, OHIO



Agricultural Machinery Manufacturers! Here's Something for You

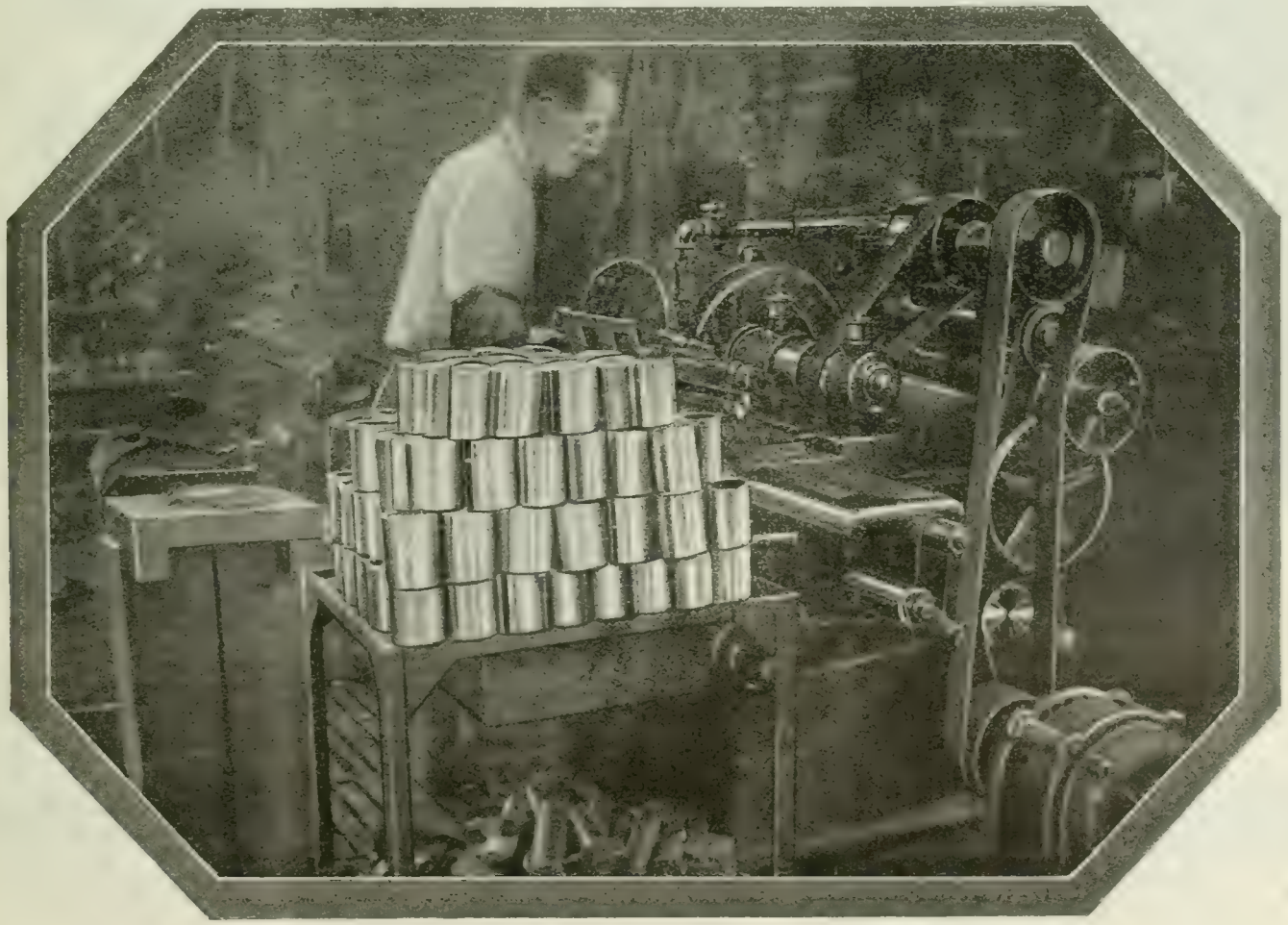
The Norton Grinding Company can help you keep down your manufacturing costs, improve the quality and finish of many of your products, and increase the output.

One of the best known agricultural machinery manufacturers uses large numbers of bronze bushings for connecting rods in a large 75-h.p. motor built by them. This concern finishes them on a 6 x 32-in. Norton Grinding Machine. The operator removes 1-32 inch stock and is allowed a tolerance of 0.001 inch. His average output is one every minute. Our Service Department will gladly furnish you with information on plain grinding. Perhaps you have work that could be done more profitably that way. Send us your blue prints.

Norton Grinding Company, Worcester, Mass.

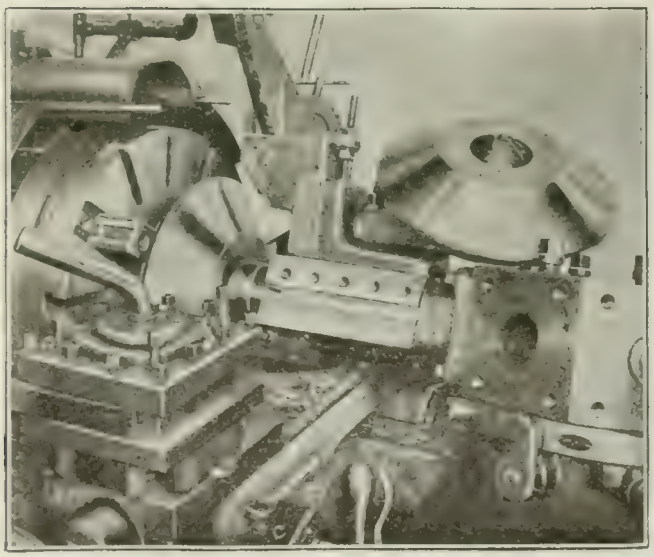
Chicago Store, 11 North Jefferson Street

Vonnegut Machinery Company, Indianapolis, Ind. **Robinson, Cary & Sands Company,** St. Paul and Duluth, Minn. **Manning, Maxwell & Moore, Inc.,** St. Louis, Mo. **Henry Prentiss Co.,** New York, N.Y.; Boston, Mass.; Buffalo, N.Y.; Rochester, N.Y.; Syracuse, N.Y.; Scranton, Penn. **The Motch & Merryweather Machinery Company,** Cleveland, O.; Detroit, Mich.; Pittsburgh, Penn.; Cleveland, O. **Eccles & Smith Company,** San Francisco, Calif.; Los Angeles, Calif.; Portland, Ore. **The Canadian Fairbanks-Morse Company, Ltd.,** Montreal, Que.; Toronto, Ont.; Vancouver, B.C. **C. T. Patterson Company, Ltd.,** New Orleans, La. **Kemp Machinery Company,** Baltimore, Md. **W. E. Shipley Machinery Company,** Philadelphia, Penn. **English Tool & Supply Company,** Kansas City, Mo. **Alfred Herbert, Ltd.,** Coventry, Eng.; Paris, France; Milan, Italy. **The F. W. Horne Company,** Tokio, Japan. **Iznosskoff & Co.,** Petrograd, Moscow and Ekaterinburg.



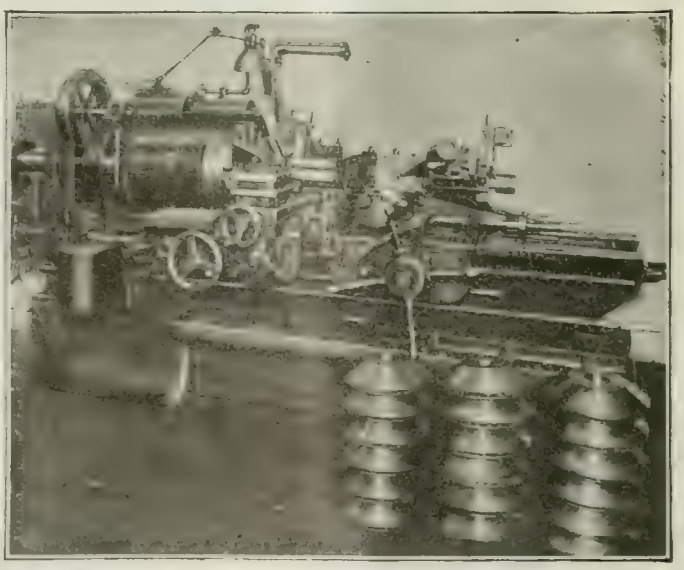
GIS

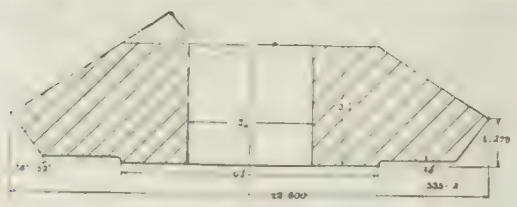
THE BEST WAY
TO MACHINE CAST STEEL BEVEL GEARS



is to use the Gisholt Standard Turret Lathe.
Quick time in producing bore. Rapid removal of scale and surplus stock. Finish cuts taken quickly and accurately. Large quantities without resetting. Superior finish. Typical advantages when you install Gisholts.

Send for the new Catalog, it is interesting.



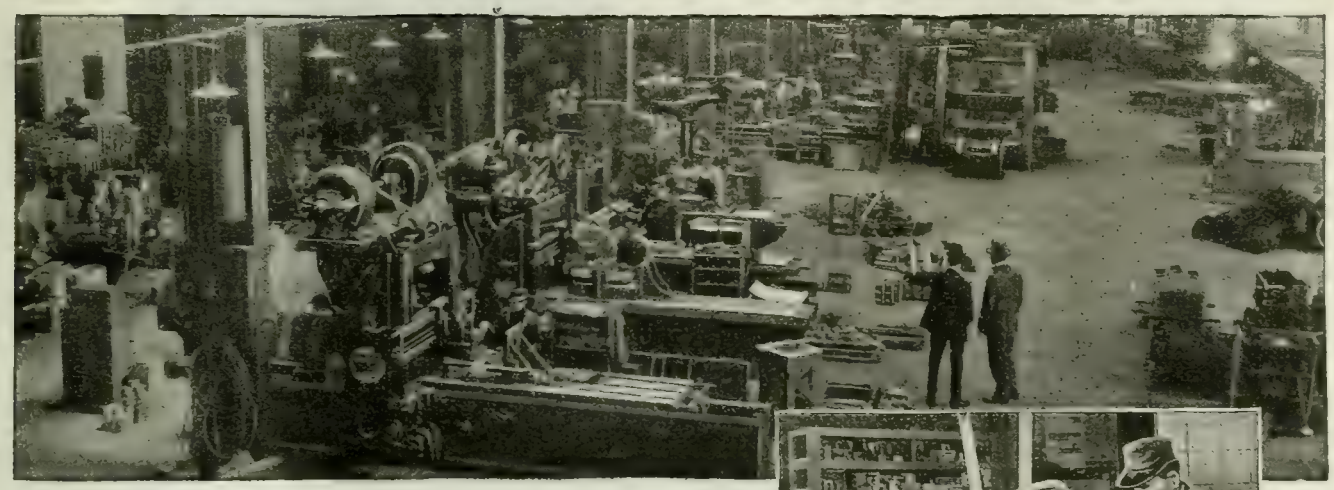


Cast Steel Bevel Gear—40 minutes

GISHOLT MACHINE COMPANY, 1207 EAST
Builders of Standard and Automatic Boring Mills, Tool Grinders,
Eastern Sales Office: 30 Church St., New York.

CANADIAN AGENTS: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

HOLT





LOOK AROUND
AT YOUR LATHES AND PLANERS

Get better acquainted with your boring mills, shapers and slotters.

These producers need accurately ground tools. Gisholt Universal Tool Grinders will feed them tools ground to just the correct angle day in and day out. Result—increased production. Can you afford to withhold this added impetus to your men and machines?

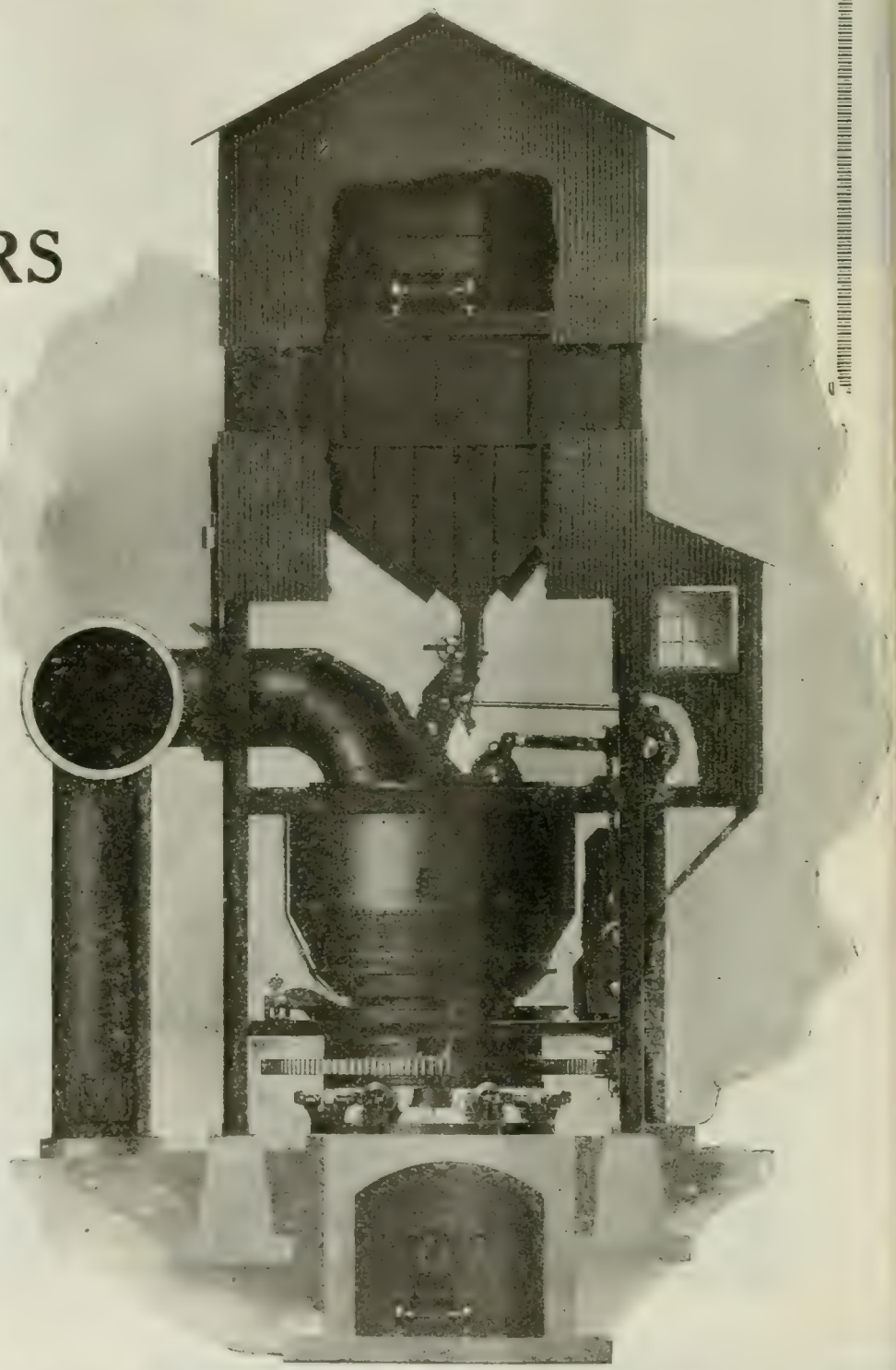
Send for the Catalog, it tells how.

Gisholt Methods Insure Accuracy and Economy

WASHINGTON AVE., MADISON, WIS., U. S. A.
Turret Lathes, Vertical and Horizontal
Small Tools, Special Machinery, etc.
Works: Madison, Wis., Warren, Pa.

CANADIAN AGENTS: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

HUGHES MECHANICAL GAS PRODUCERS



THE Wellman - Seaver-Morgan Company is prepared to install complete producer gas plants—including building, producers, coal and ash-handling equipment, gas flues and valves, or it will supply the gas producer alone.

The W-S-M organization with many years' experience in this line have incorporated in the Hughes Gas Producers correct mechanical principles and excellent materials—resulting in a producer that assures uniformity of performance, low maintenance cost and a minimum labor charge.

A new bulletin giving a detailed description of this producer has just been issued. Shall we mail you a copy?

THE WELLMAN-SEAVER-MORGAN CO.

CLEVELAND, OHIO, U.S.A.

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What is the Future of the Aircraft Business?

Will There Come a Time When Airplanes Are as Common as Automobiles? Peruse This Story and Learn How One Canadian Concern is Pioneering the Aircraft Industry

By J. H. MOORE, Associate Editor Canadian Machinery

WE hear in these post-bellum days vague prophecies of the future of the airplane. This is especially true of England, where the chief aim and object of those interested seems to be to secure undisputed supremacy of the air.

But in reading of these developments in other countries, we are often apt to forget our own shores, giving no credit to the efforts of those at home.

In fancy we hear some readers remark: "What developments are proceeding in the aviation line in Canada?" which prompts the remark: "That truly it is often the most deserving happenings that get the least publicity."

Not many miles from Toronto, at the already well-known spot named Leaside, there is proceeding one of the most wonderful ventures imaginable.

Of course, readers of CANADIAN MACHINERY remember quite well how Leaside became famous during the war time, with its munition plant and aviation field, and it is of the latter we wish to speak.

On the familiar ground where once the aspirants of Canada's aerial force looped and dipped, there now rests a peace-time aircraft industry, known as the F. G. Ericson Aircraft, Limited.

At the head of this concern is F. G. Ericson, himself (whose photograph accompanies this article), a clear-thinking individual, who talks of the aviation game—not as a game—but as a coming business, with practical knowledge of the industry to back it up. From the year 1911 he interested himself in aircraft, foreseeing its wonderful possibilities, and from this to 1913 was engaged in various phases of this interesting work. From 1913 he was connected with both the Curtiss people and the Canadian Aeroplanes, Limited, in the position of chief engineer in each case, and was also sent out to England and France by the U. S. Government to investigate aircraft conditions as practised on that side of the water.

At the cessation of hostilities the aircraft business looked as if it was about to die a sudden death (at least as far as Canada was concerned), but it was at this point that the firm convictions of Mr. Ericson held sway.

With certain business partners he purchased from the Imperial Munitions Board five hundred machines for resale to individuals, companies, or Governments in Canada, and the United States.



FIG. 1. F. G. ERICSON, IN THE UNIFORM HE WORE WHILE ON DUTY FOR THE UNITED STATES GOVERNMENT.

This meant an investment on a large scale, and required real courage on both his own and partners' part, to stick their hands in their jeans for the real cash to purchase such a large quantity of machines, but they did it.

This, on top of the fact that they were keenly aware of the fact that even after they had the machines there still remained the task of convincing a doubtful public of the possibilities of flying and its advantages. They knew only too well that the average person looks on flying as a good way of committing suicide within the law, and that not only must they prove to the skeptics that flying was safe, but they must also instil the desire to own a machine.

As Mr. Ericson puts it, "We hope to correct the erroneous impression that people have regarding the aviation business being a dangerous one. The flying proposition is just as safe, if not safer, than crossing the corner of King and Yonge streets, providing you learn the business thoroughly, keep your head, and do not attempt foolish stunts.

Connected with Mr. Ericson are Messrs. C. Pearson and F. Webster, both of whom have also been connected with the Curtiss and Canadian Aeroplane Cos. before entering this latest concern, so that, if real, practical ability means assured success, this new industry is well equipped for bigger and larger things.

But to proceed with the details of the building up of this commercial aircraft industry.

Taking in a total acreage this firm covers about 400 acres, of which 100 is at Armour Heights and 300 at Leaside. At the Leaside field they have nine hangars and twenty-seven other buildings, including a dope shop, store room, repair shop, restaurant, fire hall, and a large three-storey building containing stock rooms, drafting rooms and offices.

These statements prove convincingly that this business is in the field to stay, and, if one may be allowed a prophecy, it will.

The whole affair has been gone into, not hastily, but with foresight and careful thought. At present the chief aim is to create a demand; later, extensive production will follow. At present the

designing staff are experimenting in various ways to increase the usefulness of the machines to civilian purchasers and in Canadian J.N.4, which is the standard model being built by this company, all such points have been kept in mind.

Mr. Ericson in designing this machine mentions that stability was aimed at above all other points. This feature makes for safety. Already he has transformed a two-seat machine into a three-seater with splendid success. The pilot in this new design sits behind the two passengers. This machine he has termed the Ericson Special Three.



FIG. 2. BUILDING UP THE WINGS OF THE J.N.4 MACHINE.

To give readers some idea of the construction of the wings on this J.N.4 plane, let us refer to the photo illustrating this work going on.

These wings are made practically of wood only, the only metal being the holding and fastening clips. Of course, the covering is made from linen of Irish first quality material, or from American cotton made specially for this aircraft work. This material is first stretched and fastened, later being painted over with dope, as it is called, until the complete wing is taut, and on being hit sharply with the finger issues a sound not unlike the skin of a drum. Four coats, as a rule, of this dope is sufficient. Four men and an inspector generally work on each of these wings, the inspector attending to various wings within his department. This mention of inspector brings up a very important point in this industry, namely, the absolute necessity of a rigid inspection system. Human life hangs on the words of the inspector as to whether he says O.K. or not, and realizing such to the full, no work is passed unless perfect in every way. Each and every portion, making up the plane, passes rigid test, then later a complete test is made which will be explained further on in the article.

One type of engine is at present used in these J.N.4 machines, which is known as the Curtiss OX5 motor. These engines have eight cylinders and develop 90 horse-power at a speed of 1,400 rev. per min. The swing a propeller 8 ft. 3 in., tip to tip. The general appearance of this motor is easily seen by looking at Fig. 3.

The Preparing of Propellers

The preparing of these propellers is a study in itself, so we will content ourselves with a brief description of the operations involved. Usually these propellers are made of finest quality quarter-cut white oak, laminated together, but walnut mahogany and birch are also used. Eight or nine laminations are generally used in the average propeller, each being carefully inspected before finally glued together. A special high test animal glue is used for such work. Of course, previous to any work being done on these propellers, all the wood is thoroughly kiln dried to remove all moisture, in order to prevent possibility of shrinkage. When we say that it takes about one month and a half to complete one of these propellers, readers can see that great pains is spent to make them perfect in every way. Otherwise they are useless. In some cases these propellers are made of two or three kinds of wood, but never more than three kinds at least over in this country. In Germany, however, they are not so particular, as they use as high as six kinds in one propeller. One particular propeller which the writer looked at closely had the following woods laminated together: mahogany, oak, birch, ash, beech and maple. Some combination, and yet it looked a mighty business-like article, and, according to various authorities, delivers the goods.

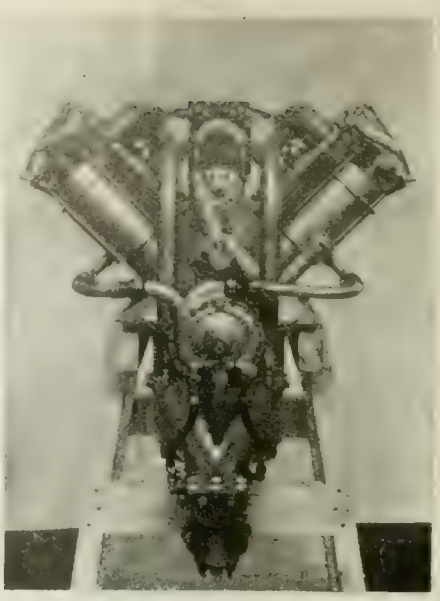


FIG. 3. AN END VIEW OF THE AIRPLANE MOTOR.

Captured German Planes

Speaking of Germany brings us up to the point where we can speak with justifiable pride of the war trophies now resting at this field we speak of. Here are several types of German machines, which will do no further damage to our airmen, who so well coped in battle with them. Chiefly among these trophies is the machine already well known as the Fokker. One of these is shown at Fig. 4, in its war paint of camouflage. Seated in this machine is none other than Lieut.-Col. Bishop, V.C., D.S.O., M.C., C.D.F.C., Canada's famous airman, together with another airman of well-known renown, namely, Lieut.-Col. Barker, V.C., D.S.O., M.C., D.F.C. Certain of these machines are to be exhibited in flight over the exhibition, while others will be placed at stationary exhibits for the onlooker to gaze at to his fill. Note the German crosses under the wings on this machine shown on Fig. 4.



FIG. 4.—A CAPTURED FOKKER MACHINE, WITH LIEUT.-COL. BISHOP, V.C., D.S.O., M.C., C.D.F.C., IN THE PILOT'S SEAT.

Other types of German machines now at these hangars are the Roland and Junker. The former is a beautiful machine, with long graceful curves, almost

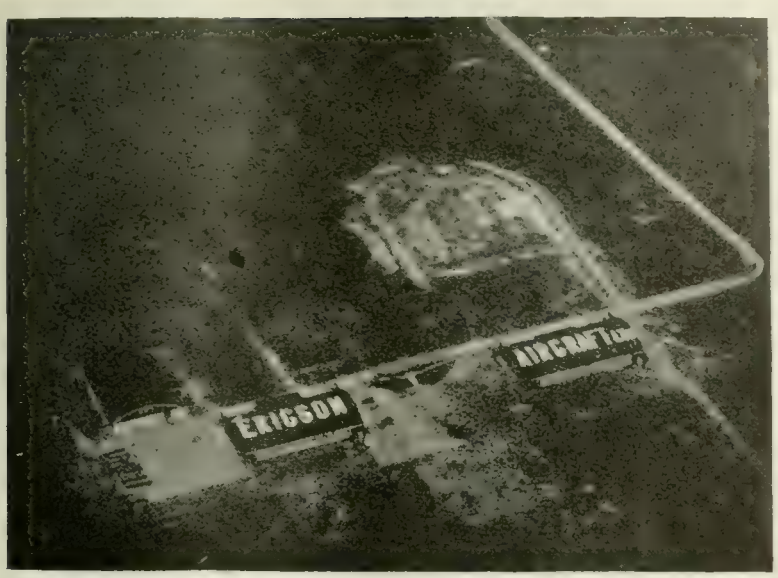


FIG. 5.—LOOKING DOWN ON A PORTION OF THE FLYING FIELD. NOTE THE BOXES ON THE GROUND CONTAINING CAPTURED GERMAN MACHINES.

like a huge fish. It is also colored in a lovely manner and looks anything like the prey seeking air carrion, which it proved to be in war time. This machine has a remarkable speed of 125 to 130 miles per hour. A Benz motor supplies the motive power for this machine; two machine guns also form a part of its equipment.

The Junker plane is of an entirely different nature, the complete engine as well as the pilot and observer being covered in with 3-16 in. armor plating. The wings and control surface are covered with corrugated sheet aluminium. This machine is also equipped with machine guns and receives its motive power from a Benz 260 h.p. motor. This type of machine was used for trench straffing, flying at low altitude and at a speed of 60 to 70 miles per hour.

At Fig. 5 we illustrate how three of the hangars look for an airplane at a height of 3,000 feet. The two hangars to the left of this photo are filled with German machines, while the boxes on the ground also contain some of these war trophies. It is interesting to note how clearly the name of this firm appears at such a distance.

Fig. 6 shows another remarkable aerial view from a height of about 5,000 feet. Here we see a picture taken in winter of a portion of country surrounding Leaside. By careful study Leaside can be seen in the background towards the right-hand portion of photo. A study of this picture will bring out clearly the advantage of aerial photography.

Speaking of winter brings to the writer's mind a statement made by Mr. Ericson, which is well worth repeating. "You ask what proof I can give you to the effect that flying intelligently is perfectly safe," he remarked. "Well, I'll tell you," and then he told the following facts:

Many of the machines which we purchased were at other points throughout the country, and, of course, the easiest way to do was to fly them into our headquarters here. We did so with not a single accident. We have had machines arrive in snow storms, hail storms and even when both rain and snow was falling, which is a nasty combination, yet no trouble. We even had men landing as late as 9 o'clock at night, when we built fires to guide their landing. "In some cases they landed with a 45 mile gale blowing," he said, but the writer was convinced without further details.

"Do you have much engine trouble," was another query popped at one of the officials of this concern, but the answer was readily forthcoming.

"We have no trouble, because we see to it that every engine is thoroughly tested. Each engine is placed on a block testing stand and tested in the following manner: For the first hour and a half the engine is run at 300 r.p.m. It is then stopped, oiled and inspected, then started once more on another 1½ hours run, at maximum speed of 1,400 r.p.m. A final inspection is now made and the engine must show absolutely no results of the strain. Providing it proves O.K. it is now installed in the machine and once more tested on the ground. This proving satisfactory, the machine goes on its trial flight. Of course, the other portions of the plane have all been thoroughly tested previously to this stage."

When up on its trial flight the machine is purposely put through all sorts of manoeuvres to place every strain on it, which would, or even might occur in an actual unforeseen condition. For instance, if by some means or other an aviator should come close to a tree, as shown on Fig. 6, he must make a vertical bank in order to miss the same. In this photo we see the machine just clearing the tree and starting to rise again. Such a stunt, of course, places considerable strain on the machine, which is what is wanted, for, on returning from its flight, the whole machine is gone over thoroughly before the final O.K. is placed on it as suitable for flying purposes.

The Staff

And now a word of the staff which devotes its time to this interesting work. Fig. 7 illustrates the staff as they appear en-masse. Approximately 200 employees are engaged on this work, and they co-operate as one big family.

To illustrate this point, let us quote what happened at what we believe is the first aerial picnic ever held:

On July 24th, with the aid of his executive staff, Mr. Ericson gave a picnic at the field for the benefit of his employees. The regular sports were held, but in addition to these regular sports, passenger carrying and exhibition flights were held, each employee desiring a flight going up. Five pilots handled the machines, their names being as follows: Capt. McCrudden, Lieut. McCarthy, Lieut. Moore, Lieut. Shiller, and Lieut. Colby.

Over 160 flights were made with absolutely no mishaps and even one lady 78 years of age partook in the flights.



FIG. 6. A REMARKABLE AERIAL PICTURE TAKEN DURING WINTER THE WHITE STREAKS, OF COURSE, ARE SNOW.

This particular case caused much amusement, for this lady's son had worked on aeroplane work for 4 years but had never even been up in the air, and his mother thus showing him the way, made him the butt of considerable joking. The employees, after the picnic, presented Mr. Ericson with a handsome library table and chair, to not only show their appreciation for the good time enjoyed, but it also happened to be Mr. Ericson's birthday. This close relationship between employer and employees explains



FIG. 7. MAKING A VERTICAL BANK, IN ORDER TO MISS THE TREE.

the harmony that exists in this concern.

And now as a sort of a conclusion, let us read what an Old Country air enthusiast has to say of the air business and its possibility. He starts off as follows: "The good time is coming." Every man his own aeroplane. This chap, for want of a better name, calls himself Windstick—so we will let him have his say:

"Why should you not own an aeroplane in the near future? If you can afford a small motor-car, there is nothing impossible about the prospect, when you remember that the best engineering brains in Britain are now busy designing it for you. A little runabout 'plane like this would not require overhauling oftener than once in every two hundred hours of flying, and the work would present very few difficulties to the mechanically-minded amateur. Its maximum speed would not be very high; say, sixty miles an hour. It would be capable of landing at about thirty miles an hour (thus lessening the liability to accident on alighting); as pressed metal would be largely employed in its construction it would be practically fireproof, thus doing away with the worst bogey of the air; and its running costs would work out at about three-pence per mile. (This figure is conservative, and has often been improved upon.)

The £200 Machine

The private driver will keep to the lower lanes of the air, and he will not need to work his engine at full power the whole time, as has necessarily been done in the war. The aeroplane will run for a year with nothing more than common-sense attention. This little machine, as designed (for it has been designed, you know, and flown), will be capable of taking off from the ground in a distance of twice its own length. It will have a self-starter, and the pilot's seat will be cosy, with a few simple instruments to navigate by. If his engine fails, the machine has a long "gliding angle," which will enable him to select a suitable landing-ground, where he can alight easily, insulated from all shocks by cunningly devised springing, and set about the necessary repair, or call up the nearest repair station on his miniature wireless set. He will store the machine at his club hangar for a nominal cost.

The price of such a little craft as this? Now that English factories are organized for "quantity production," and can make duplicate parts of high quality with fabulous speed, this need not be more than—guess?

Two hundred pounds! Just that.

The Week-End Flight

Imagine that your week's work is done, and that you have arrived at the communal aerodrome of the future. The mechanics have unlocked your shed, and wheeled your baby machine out on the grass, where she sways lightly in the wind, as graceful in her gleaming coat of yellow and silver as a bird on a bough.

You step into the comfortable, sheltered cockpit, where no worrying wind can reach you, clad in clothes which are electrically warmed by a tiny fan-driven generator which the wind of your passage revolves. A glance at the controls and the glistening dials in front of you, you press your foot on a button on the floor, and the engine roars into life. Across the sunny grass you speed, the machine hops once—twice—she is off, and you are master of the sky until Monday, which you need not think about!

The machine gains height, there is no vibration, only the pleasant, monotonous whirr of the propeller cleaving its way, and the hum of well-oiled machinery. The hangars below you grow rapidly smaller, the sun glistens on their roofs of corrugated iron, making them look like cubes of sugar. The machine heels over, and you look down the slope of the polished wing at the pretty mosaic of the brown and green earth. Church spires wheel below you as you turn, and the sound of the villages, the shout of a boy, the shrill yap of a dog, drifts dimly up to you.

In a minute it is dark, a thick enfolding moist blanket. You have run into a cloud. Quickly you are out again, and the sun beams with renewed vigor; you can still feel the genial warmth of it. But soon you will have "got your height," then it will be cold, and you will switch on the current that envelops you from head to foot in a grateful glow. You rectify your flight by a map which automatically unrolls before you, and you land when or where you like!

By reason of their swift intuition and light touch women are specially adapted by nature for the control of quick-responding machinery, and who knows but what the commercial fleets of the future will be largely "manned" by women pilots?

Airship Luxury

For staider passengers, who feel no need for haste, and do not feel inclined to go to the expense of a private aeroplane, there will always be the dirigible services. These great "rigid" flying machines, not dissimilar to the modern Zeppelin, but far less unwieldy, and immune from risk of fire, will operate over long distances.

As weight need hardly be considered, they will be fitted and furnished with a view to utmost comfort. You will feel as safe in them as you would in a mighty liner of to-day. There will be no perceptible motion, no pitching and tossing, and the huge craft will glide serenely through the skies with all the ease and confidence of the eagle.

There will be fine saloons with mahogany panelling, dainty tables and wicker-work chairs grouped enticingly on carpets of Utrecht velvet; and through the long windows of unbreakable glass the passengers will be able to drink in the marvellous panorama spread wide



FIG. 8. HERE IS THE HAPPY FAMILY, WITH THE ERICSON SPECIAL THREE MACHINE, SPOKEN OF IN ARTICLE, SHOWING UP TO GOOD ADVANTAGE.

about them. Through occasional windows let into the floor they will be able to note every detail of a town as they pass silently and majestically overhead. There will be no smell, for the engine-rooms will be far away from the cabin, and sea-sickness, or its equivalent, air-sickness, will be a forgotten evil. *Should* anything by chance go wrong with the machinery, the great ships of the air can hover at anchor until it is rectified; there will be no "forced landings," and fuel can be taken on from ships at sea. Two hundred tons can be carried by such craft with ease!

Far from being over-fanciful, my picture, I am convinced, falls short of the aerial wonders awaiting us in the near future.

While we do not for one moment imagine that readers will agree with the above, still we must admit that all new inventions have advanced as a rule with very rapid strides, so let us watch the future of the acroplane with keen interest, in the meantime taking off our hats to our Canadian Concern that has had the courage to lead the way on this side of the water.

The Art of Properly Grinding the Twist Drill

Being a Series of Notes and Sketches, Showing How to Grind Correctly Twist Drills, in Norton Grinding Machines. Mechanics in General Will Appreciate Such an Article

A CORRESPONDENT sends some notes and sketches on the grinding of twist drills in the Norton grinding machines. He gives useful particulars about suitable grinding wheels, speeds, feeds, order of operations, production times, and a few necessary fittings special to the job.

Grinding Wheels

For grinding the fluted parallel of taper shank drills or the whole lengths when the drill is parallel throughout the most suitable wheels are Norton 60 grit and N. to P. grade. For grinding shanks, taper or otherwise, in a plunging cut with wheels fully as broad as the shank is long, the most suitable wheels are Norton 46 grit L. grade or 24 grit C.L. grade.

Speeds

The grinding wheels should be run

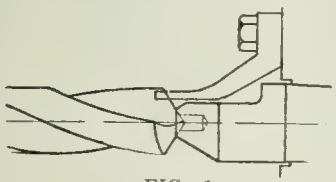


FIG. 1.

at a surface speed of 6,000 to 6.500 feet per minute for both traversing and plunging cut grinding. The workpiece in traverse grinding should be revolved at a surface speed of 60 to 80 feet per minute and for plunging cuts, at 40 to 60 feet per minute.

Machines

For drills of various sizes the most suitable Norton machines are: For drills up to ⅜-in. dia., 3-in. by 18-in. machine; ⅜-in. to 1¼-in. dia., 6-in. by 32-in. machine; 1 5-16-in. dia. and upwards, 10-in. by 36-in. machine. For grinding shanks, taper or parallel, in a plunging cut with wide or "formed" wheel, the 6-in. by 32-in. machine may be used if the shank is under 4-in. in length; but the best results are obtained in form grinding with the Norton 10-in. by 24-in. special purpose machine. The fluted portion should be ground by the traversing method only.

Drivers

A special driver is necessary so that the peg will enter the flute of the drill and leave the round surface clear for the grinding wheel. Fig. 1 shows a simple and effective design which may be attached to the driving plate where a running centre is used. If the drill is very small the driver may be modified for attachment to the running centre. Where a dead centre is used a slight modification would enable it to clear the centre. When the fluted end is ground as a separate operation the ordinary carrier is fixed on the shank end.

Grinding Allowance

The drills should have not less than 0.005-in. to 0.008-in. left on the diameter for grinding, after previous machining operations are completed.

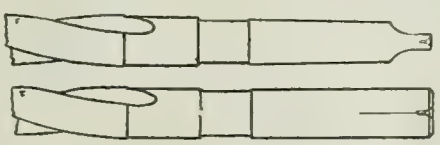
Small Drills

Drills up to ⅜-in. dia. may be classed as small, and generally have straight shanks parallel with the fluted portion. Those as small as 3-16-in. and under should be ground with a running spindle attachment. The full length is ground at one operation at the rate of about 60 per hour, but very small drills take longer owing to the inconvenience of handling them.

Many small drills are made with a slight taper on the fluted portion, the cutting end being the largest. Two operations are necessary with these, and each operation will take practically the same time as grinding the whole drill parallel. Grind the fluted part first.

Medium and Large Drills

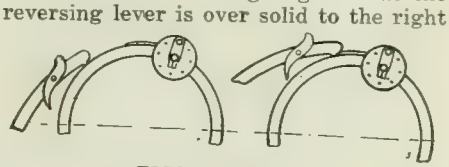
These are generally made in three forms; with round shank parallel with fluted portion as in Fig. 2, with taper shank as in Fig. 3, or with tapered square shank for ratchet or brace use.



FIGS. 2 AND 3.

It is usual to have a recess in both the forms shown in Figs. 2 and 3, and a slightly reduced portion from about the end of the flutes to the recess. There should also be a slightly reduced part in square shank drills. These parts need not be ground; the size of the drill is stamped on one of them, preferably on the smallest, or on one of the flats of the square shank.

In grinding any of these, put the carrier on the shank end. After putting the drill in the grinding machine centres set the left hand reversing dog so that the reversing lever is over solid to the right



FIGS. 4 AND 5.

when the corner of the wheel is over the centre of the recess. If there is no recess and the shank shoulder is larger than the drill, the wheel should just touch the shoulder. Then set the right hand reversing dog so that the table will reverse when the wheel overlaps the job by about an inch.

On starting grinding, bring the wheel forward to left hand end as already defined, and feed straight in to plus 0.002-in. of the required size. Put traverse belt and lever over for the second slowest table speed possible and put in traverse lever, thus removing all but 0.002-in. in one cut. The production rate for this cut should be 27-in. of length per minute on a 6-in. by 12-in. machine and 22-in. on a 10-in. by 36-in. machine.

Immediately this cut has been completed, swing over the two-speed traverse lever (on front of the machine) and finish to size in cuts of 0.0005-in. per traverse. The automatic feed pawl link should be set on the quadrant to give a feed of two notches (0.0005-in.) on each reversal of the table. The carrier can be put on the next drill while the machine is automatically making the finishing cuts. The actual grinding times for grinding the fluted parts of ¾-in. drills of 6½-in. standard length is 30 seconds, and 1¼-in. dia. 9-in. standard length, 40 seconds, both on the 6-in. by 22-in. machine. These times allow for removing up to 0.010-in. to 0.015-in. from the diameters.

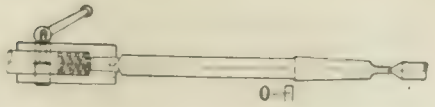
The positions of the automatic feed pawl are shown in Figs. 4 and 5.

Grinding Shanks

The shanks, parallel or taper, are most economically ground in one plunging cut on a Norton S. P. machine. A wide wheel is used, parallel or formed to the taper. The actual grinding time on, for

example, a No. 3 Morse taper shank or parallel shank of about the same length is 30 seconds for removing up to 0.015-in. from the diameter.

It is very often necessary to grind shanks in two operations on account of the slight distortion that occurs on some steels after grinding. This distortion is so slight that it is not appreciable on a parallel unless the gauging hole is very long, when a slight binding would be felt. It is more easily felt on a taper gauge. If it is found that the steel has this tendency, and two operations are necessary, reduce to 0.003-in. above size



at first operation. Lay the drills aside for at least 12 hours and then finish to size as a second operation.

Variation in Lengths

Where the drills as received for grinding are not exactly the same length a quick means of adjustment must be found, so that the shank may be ground at the correct distance from the shoulder. Fig. 6 shows a fitting which has been found successful and sufficient. A spring centre is fitted as shown, and a setting piece o is fixed to locate the shoulder. If adjustment is necessary, slack the spring centre clamp, with the workpiece between the centres, and adjust the shoulder to the setting piece by the tailstock screw. Then tighten the spring centre clamp and adjust the tailstock centre for running.

If good methods are followed throughout it is not difficult to grind twist drills to fine accuracy and in quick time.

Speed Up Production by Systematic Handling

It is a Recognized Fact That Any System Which Will Facilitate the Handling of a Product, Means a Lowering of Manufacturing Cost. Herein is Described One Lamson Method of Handling Goods

By J. H. MOORE, Associate Editor Canadian Machinery

IT is a well-known fact that in a plant of any size to speak of, there exists in some form or other a bugbear which we, in general terms, speak of as industrial leakage.

Industrial leaks are to a certain extent bound to occur in some form or other, for we cannot secure perfect plant efficiency any more than we can secure perpetual motion, but we can, by careful thought, trace the leaks to their source and improve these conditions as far as lies in our power.

When tracing the cost of a product and its existing high cost figure, it is often surprising to find how simple the remedy is. As a rule the trouble boils itself down to three things, namely: machine tool equipment, system of routing, or system of handling.

Generally the first item does not enter into the trouble at all, for in these modern days the up-to-date master mechanic sees to it that his shop is well equipped with the best time and labor-saving machines possible.

Unfortunately many of them stop at this point and do not consider the other two equally important points, namely, the routing and handling of the product.

To successfully reduce the cost of any product one must thoroughly study the course of the products' manufacture, routing the same in such a way that every possible lost motion is eliminated. No unnecessary jumps should be made, but the tool equipment should be so arranged that not only will the work pass along evenly and systematically but there must be no congestion at the various machines, for congestion means time wasted, worry, and added expense.

There was a time when it was considered all right to have hunkies (as we called them) bring us our material in almost any method as long as we got it. Usually these fellows were tall, husky chaps hired at about $1.25 per day, with very little brains more than that they only accomplish the certain task to which they were allotted. Often there was too much work given for each man to do, with the result that before long the work would pile around some particular operator's machine, with the outcome that production suffered and costs went up.

It took considerable time to convince certain plants where their trouble lay, but luckily at a later date they went after the trouble with surprising results.

Numerous methods have been employed, and one method which has improved the handling problem to a wonderful extent is that of the gravity system.

What is the Gravity System?

The gravity system is a series of rollers, which together form a roller conveyor. Each roller is mounted on a ball-bearing, which of course makes each roller sensitive to movement. This system uses the free power of gravity, which, so to speak, costs nothing, for gravity is always on the job at your command.

To quote what particular products can be carried by such a system is impossible, for practically all products having at least one flat surface can be carried direct on one of these conveyors.

To illustrate this system of moving material, let us consider Figs. 1 to 5.

Here at Fig. 1 we see a typical overhead installation, with the gentleman shown in the picture about to pull the handle of the switch in order to divert the product in desired direction.

This is one of the features which make such conveyors of great convenience, for the gravity system is flexible as a railroad track. Depending upon your required direction, the conveyor can be made to suit, and owing to the small space occupied by such a conveyor the



FIG. 1.—NOTE THE OPERATOR MOVING SWITCH, TO CHANGE DIRECTION OF PRODUCT.

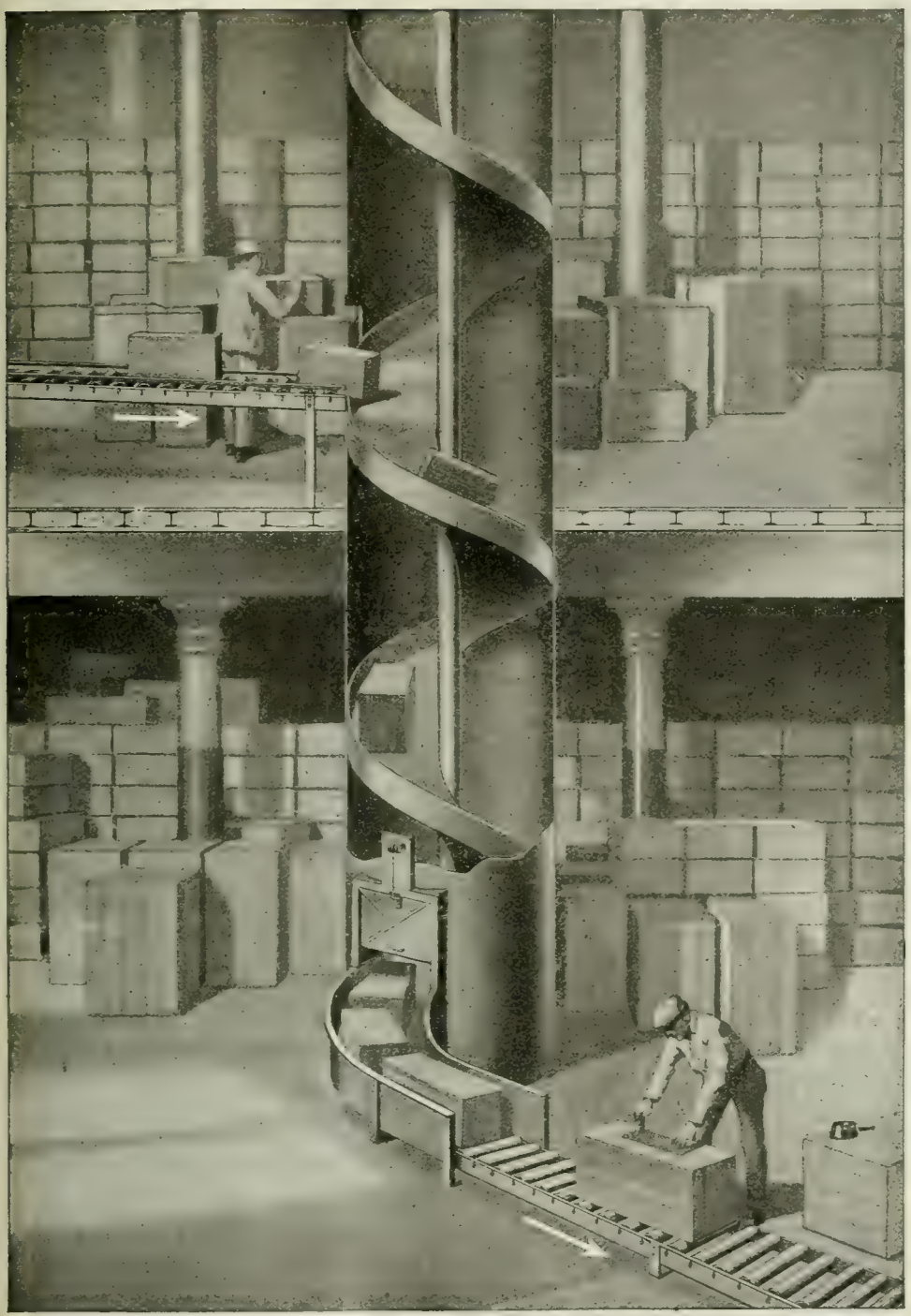


FIG. 2—A GOOD ILLUSTRATION OF A SPIRAL CHUTE BETWEEN FLOORS.

tracks can run between machines, around columns and obstructions without any trouble.

Production from a given floor area is increased in many cases over 50 per cent. More machines can be installed on floors that are clear of stock, while the machines can be kept up to capacity all day long, when conveyors properly placed keep the workmen supplied with materials.

To convey your product from floor to floor is a simple matter with the gravity system. A spiral conveyor or chute is arranged as shown at Fig. 2. The remainder of operation is self obvious. Place your product on the gravity conveyor on one floor, when it will enter the chute, descend to the desired floor, and once more be carried on to a further operation.

Use in the Machine Shop

To state all the uses of this type of conveyor in the machine shop would take a volume, but as one example, let us study Fig. 3.

The conveyor shown is used in the plant of the Domestic Engineering Company, Dayton, Ohio, for transporting their Delco light outfits to the shipping platform. The crates are bolted to the skids as the machines pass along the conveyor. This method naturally saves time and labor. The shipping address is also stenciled while the product is, so to speak, on the move. The crated machines are then conveyed direct to the waiting car or delivery truck as the case may be.

Use in the Foundry

Let us now consider two illustrations in the foundry. Fig. 4 illustrates to good advantage how separate portable sections of conveyors can be used with splendid results outside the plant altogether. Here we see the men busy unloading pig iron from cars at the plant of the Saco-Lowell Co., Lowell, Mass. By such a system they have been able to save more than half the labor in unloading and piling cars. Of course the conveyor, being of portable construction, can be shortened or lengthened as desired. The benefit of this is self apparent, so no further mention on photo is necessary.

The fifth and last picture in this article shows the same style system installed inside the foundry.

In this foundry, castings, as they come from the moulds, are carried on pallets or in trays to the sand-blast or pickle room. The conveyors are so arranged that they can be moved about the foundry wherever they are wanted. Flasks are also brought by conveyor from the storage to the moulding floor. Cores are carried in the same way from the core ovens to the foundry floors. Other uses for this type of conveyor are inumerable, but these two examples as already illustrated and described will suffice.

To summarize briefly, it might be said that the gravity system of conveying has proved by its results to be a direct killer of high handling costs, so that should you be contemplating some system of transporting your product in an efficient manner, it will be wise to consider this style of movement.

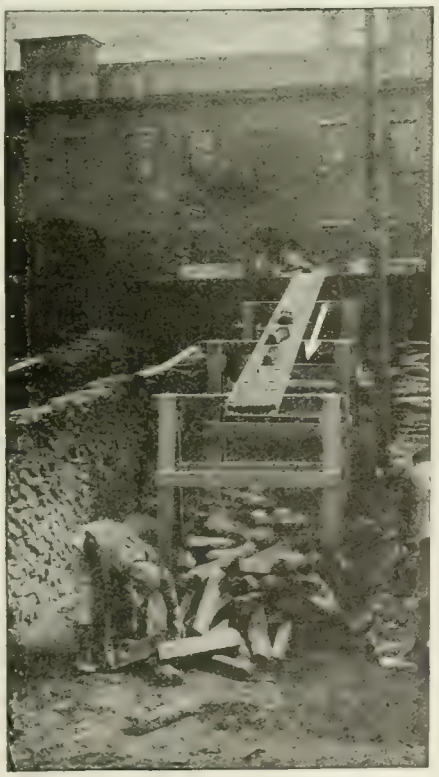


FIG. 4—GET RID OF YOUR CAR UNLOADING PROBLEMS IN THIS MANNER.

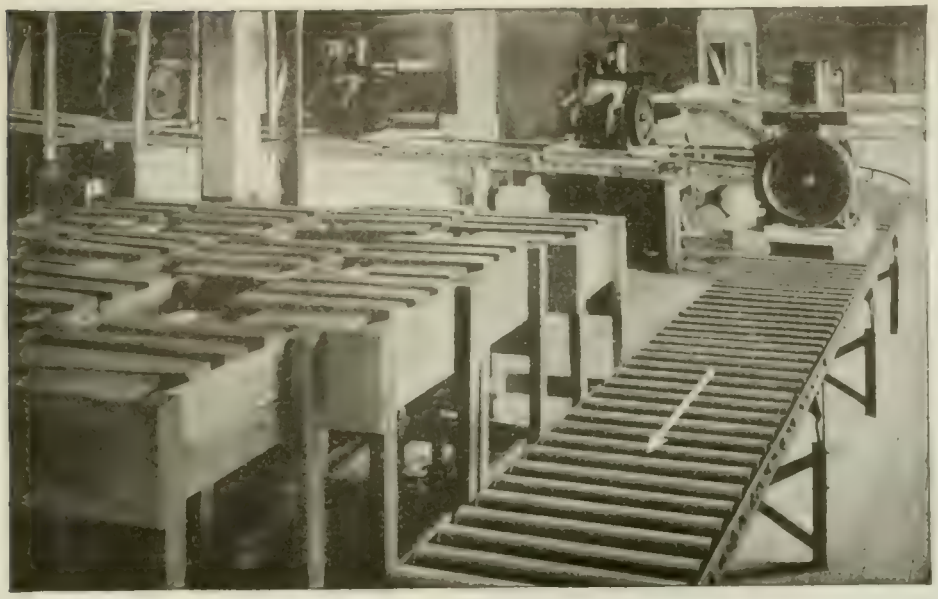


FIG 4. THESE DELCO LIGHT OUTFITS ARE CRATED AND STENCILED WHILE ON THE MOVE.

YARDS, FEET AND INCHES

It is interesting to study how standards of measurements are arrived at, or least how they were arrived at in days of old. It is doubtful if anyone would try to get up anything of the kind in these modern days. For instance, the "metre," which is the standard of measurement used in France, is based upon the length of a quadrant of the meridian, measured between the equator and the North Pole. The ten-millionth part of this quadrantal arc was adopted to be the lineal measuring unit. The reader will understand that a meridian is a line, or rather an imaginary line running from the North Pole to the South Pole, and, of course, passing straight through the equator at right angles to it. Correctly speaking, it goes right around, making a complete circle. Now if we take the quadrant or quarter circle of this meridian, which reaches from the equator to the North Pole, and divide it by ten million, we have the "metre" or the French standard of measurement equivalent to 39.37 inhces, or 1.09362311 yards; the yard being the English standard measure of length, and having equally as interesting a history. The original way of proving the standard English measure was to find the length of a pendulum vibrating seconds of mean time in a vacuum at sea level in the latitude of London. The length of the pendulum which would make this beat in exactly a second, was supposed to be 39.1393 inches, or almost the same as the Frenchman's metre. Why they did not call this the yard is hard to say, but the yard had to be the proper fraction of this to make it 36 inches. Of course, in the first place, there were no inches, but the length of the pendulum divided by 39.1393 made an inch, and this multiplied by 36 made the yard. When the British Parliament Buildings were burned in 1834 the standard Imperial yard went with them, and when an effort was made to replace it by means of the pendulum, it was found to be inaccurate—so much so that finally all attempts at reproducing the lost standard by this means were abandoned. It was then decided to construct a new standard yard by reference to copies that had been previously made, and that had been compared with the original standard yard. The next thing was to get a material which could be relied upon of which to construct the new standard. This work was entrusted to Sir Francis Bailey, who, unfortunately, died before its completion. As the result of a great many experiments, Sir Francis had decided on an alloy composed of 16 parts of copper, 2½ parts tin, and 1 part zinc, as the most suitable material for a standard bar. This alloy is still known by the name of "Bailey's Metal." The work of restoration was finally completed by Rev. R. Sheepshanks, and the new standard imperial yard bar that he produced is now known as "Bronze" No. 1. It is made of Bailey's metal; it is 38 inches long and an inch square.

At a distance of 1 inch from each end of the bar, holes are drilled, in which gold plugs are inserted. The upper surface of the plugs is made to coincide with the axis of the bar, to obviate the influence of flexure. Defining lines are parallel, and at right angle to the axis. They represent the yard at a temperature of 62° Fah. Four copies, known as parliamentary copies, were then made and distributed to the Royal mint, and the Westminster Palace. The original bar is kept within the walls of the House of Parliament, while the copy known as "Bronze No. 6," which is the accessible standard used for comparison, is preserved in the strong room of the old Treasury. Additional copies were eventually made, two of which were delivered in 1856 to the United States Government. These are technically known as "Bronze No. 11" and Laow Moor Tron No. 57."

It is a curious fact that while the bars presented to the United States are the standard which Americans depend upon when great precision is required, no standard of length of the English system of measurement has ever been formally legalized in the United States, but in 1866, ten years after receipt of these bars, Congress passed a law declaring a metric bar in the possession of the Government to be the legal standard, so that the only standard of length recognized by law in the United States is the metric. However, Great Britain and Canada, as well as the United States, have used the old yards, feet and inches so long that it is doubtful if a proposed change would find much support, and while the pendulum system of finding the correct yard was proved to be a joke, it might be possible that if a pedestrian with a stride of a metre undertook to step off ten million paces from the equator that he would be a few kilometres astray by the time he reached the ninetieth degree, commonly known as the North Pole.

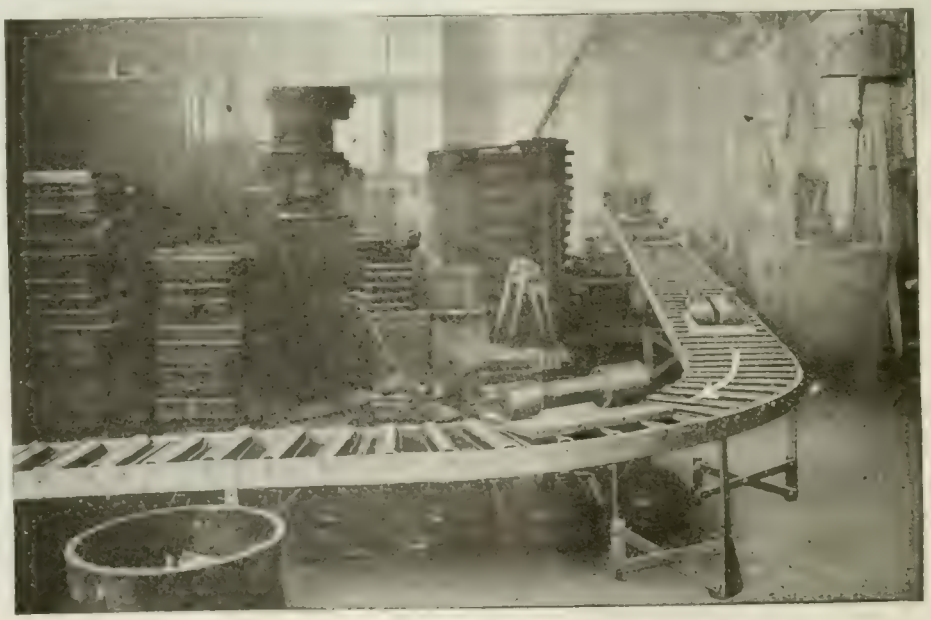


FIG 5. A FOUNDRY EQUIPPED AS SHOWN IS WELL ON THE WAY TO INCREASED PRODUCTION.

The Use of Compressed Air in Modern Industry

A Comprehensive Study on the Use of Air Operated Tools, in the Mining, Contracting, Foundry, Shipbuilding and Machine Shop Fields. Pumping by Compressed Air is Also Discussed

By A. W. SWAN

IT is a bold undertaking to attempt to give in one article of two or three thousand words a description of the hundred and one uses of compressed air in modern industry, just as it would be to give an adequate description of the part played by electricity in the same space. But electricity has its "press-agents," and the marvels of electrical engineering are far better known outside engineering circles than those of compressed air, although compressed air has almost as many applications.

One is apt to think of compressed air as a rival of electricity; it is quite true that in a few cases one has a choice between the two, but in the great majority of places where compressed air is at



JACKHAMER DRILL ON FOUNDATION WORK, ROMAN CATHOLIC CATHEDRAL, SHERBROOKE.

work, electricity does not offer a satisfactory alternative, and as a matter of fact most modern air compressors have electric drive.

Mining—Rock Drill, Etc.

Perhaps the greatest field of all for compressed air is mining. Since the earliest days of drilling rock by power there has been no serious rival to the pneumatic drill. Electricity is particularly adapted for rotating motion as in the ordinary electric motor; compressed air on the other hand is specially adapted to reciprocating motion as in the pneumatic rock drill, either of the older fashioned type, where the piston was rigidly connected to the drill steel, or the modern "hammer drill," where the piston is free in the cylinder, and literally hammers on the drill steel while the steel is mechanically rotated in the hole. Compressed air can be economically transmitted for long distances with very little loss of power such as occurs from radiation losses, where steam is used, and in mines where sparks of any kind would be highly dangerous—as in coal mining—compressed air is doubly necessary. The modern "hammer-drill" has been very highly developed, drilling 8 to 12 inches a minute in hard rock has become possible, and in fact, the problem now is more to find a drill steel which will withstand the tremendous power of the drill. Two main types of rock drill have been developed, the heavier two-man drill, usually mounted on a tripod or column mounting, and the lighter one-man drill for sinking shafts, etc., and weighing anywhere from 30 to 60 lbs.

Contracting — Rock Drill, Tie-Tamper, Cement-Gun, Etc.

The small rock drill of the jackhamer type is of great service to the contractor. One of the chief troubles in connection with the steam shovel is delay due to large boulders too big for the shovel to handle; in fact W. L. Saunders in his book on "Rock Drilling," estimates delays of thirty to fifty per cent. due to this cause. With a couple of small rock drills on the job, these delays can be largely avoided. Other uses for the small rock drill in contracting work are for breaking rock in foundation and trench work, etc. The photograph illustrates a jackhamer drill at work on the foundation of the new Roman Catholic cathedral at Sherbrooke, Que. This particular contractor has three small rock drills at work all the time on foundation and road work. In structural work the same tool is of considerable value. In reconstructing the Edison Works, Orange, N.J., after the fire in 1914, there were 9,500 window-bolt holes to drill in the concrete walls; this work was all done with the small pneumatic rock drill. For cutting out concrete foundations, drilling holes in concrete floors for machine foundations, etc., the same tool is handy. Still another application is in street railway work for chipping asphalt and concrete. In some cases the jackhamer type of drill is used for this work, at other times the pneumatic tie-tamper. Using the later type of equipment, the Elmira (N.Y.) street railway company found that the average speed was 47 ft. per hour per tool, which is very different from the speed with hand chipping.

The tie-tamper has quite an interesting history; it was at first introduced against some opposition on the part of railway men, but its use has spread so quickly that in five years it has become standard equipment on most of the great railway systems of the United States, and at the convention of the American Railway Engineering Association in Chicago this year one of the speakers declared that "No tool in recent years furnished to the track forces has filled a greater void than the power-operated tie-tamper." The pneumatic tie-tamper operates on the same principle as ordinary hand tamping; the outfits are self-contained, self-propelling, gasoline-driven compressor car with either two or four tamping machines.



PNEUMATIC TIE-TAMPER IN NEW YORK SUBWAY.

Before leaving the subject of contracting we must not forget the use of compressed air in connection with concrete, in the cement-gun and blowing concrete—both patented processes. In using the cement-gun the concrete is blown on as a spray, one of the chief applications of the process is in preserving existing structures such as bridges, etc. Blowing concrete is entirely different. In this process batches of concrete are blown from a central point through pipes to the forms; aggregates up to 4 inches diameter being used; the process is of special value in tunnel work.

Foundry—Air Hoists, Pneumatic Rammer, Sand-Blast, Pneumatic Chipper, Etc.

Coming now to manufacturing, the backbone of supply to most manufacturing plants is the foundry. Compressed air is so valuable in the foundry, and has so many widely varied uses that Mr. Robert L. Streeter has said, "It would not be very far from the truth to say that compressed air is as necessary in the foundry as sand is."

In the first place air hoists have quite a variety of applications. There are two

types of air hoist, each with a definite field of use. The direct-lift hoist consists of cylinder, piston—to which the hoisting rod is directly attached, and valve; and is much the simplest and cheapest form of power hoist, both in first cost and operating expense. The motor type of air hoist has a three-cylinder air motor geared to the hoist proper, the motor being of the same type as is used in the pneumatic drill. The motor type of hoist is not limited in lift as the direct lift air hoist is, and does not require so much headroom; on the other hand, it costs more to instal and operate. Both types find considerable use in foundry work, the direct-lift type for operating core, oven doors, etc., the motor type in operating jib cranes, and on runways to handle moulds, etc.



LITTLE DAVID PNEUMATIC RIVETER AT WORK.

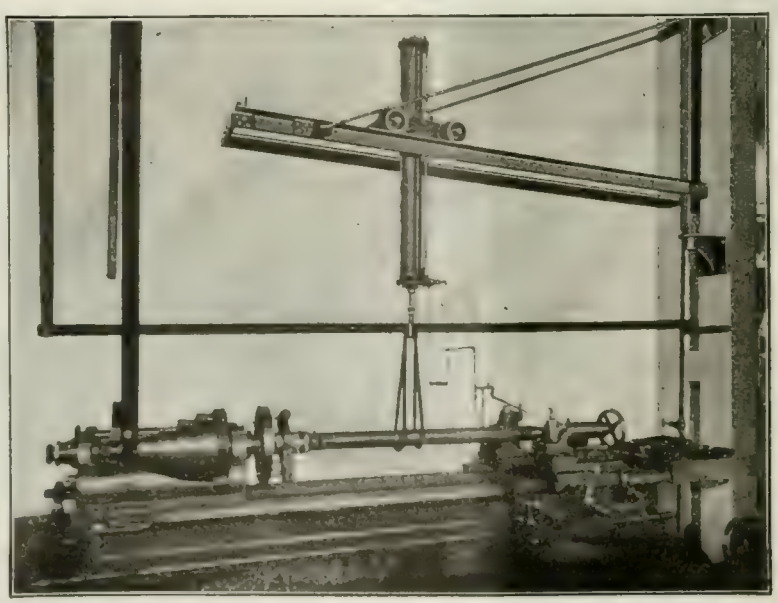
On the foundry moulding floor there are a number of ways in which compressed air is put to work. The core sand is conveniently sifted in an air-operated sand riddle; then there is the pneumatic sand-rammer, which is practically the ordinary hand-rammer operated by compressed air, that is to say the kind of work done by the pneumatic sand-rammer is similar to that done by the hand-rammer, but very much faster, and more uniform. Two types of pneumatic rammer are in use, for bench and floor. W. S. Armstrong, in an article on "Comperssed Air in the Foundry," which appeared in "Compressed Air," quotes a foundry superintendent of his acquaintance as saying: "The pneumatic sand-rammer for foundry work has demonstrated that it is one of the greatest friends and labor savers of the progressive foundryman to-day. When the sand rammer was first introduced there was some criticism concerning it, mainly arising from the natural antipathy mechanics have for anything in the machine line, but as the operators became familiar with its use and recognized its effectiveness, this feeling rapidly disappeared. To-day in our foundry the men take kindly to these rammers, and use them entirely for work of every description."

Power squeezers, roll-over, and pattern-drawing machines—all operated by compressed air—are made by a number of manufacturers such as Tabor, Mumford and others. These cut down the labor and time of making moulds.

Coming to the cleaning department of the foundry the sand-blast claims attention. Of all the various methods of cleaning castings the sand-blast is the best for the greatest variety of work. The sand cleans by a chipping action, and the thousands of sharp particles of clean sand make a good job and absolutely transform the appearance of a machine frame, for instance. Handles and levers that have been sand-blasted are much more pleasant to the feel, and the sand-blast is a valuable help to the inspection department in its search for defects in forgings; these show very plainly after being cleaned in this way. In the early days of development the sand-blast was none too healthy for the operator, but modern equipment with special rooms, etc., has done away with this difficulty to a large extent. A curious point in sand-blasting is that the right pressure to use depends to some extent on the material being cleaned Mr. R. L. Streeter, for instance, gives 60 lbs. pressure for brass and aluminum, 80 lbs. for grey iron and malleable iron, and 90 lbs. for steel castings.

Two of the large family of pneumatic tools are found working in the cleaning department of the foundry: the pneumatic chipper and grinder. Both of these are in use to remove fins, smooth down corners, and generally improve the general appearance of castings. In steel mills pneumatic chippers are also used to chip out seams in order to discover how deep they may be, and determine whether the billet or forging must be scrapped. The pneumatic chipper is an air-operated hammer, the piston moves freely in the cylinder and hammers on the chisel head. The chief point of design is the valve; the number of blows delivered per minute is in the neighborhood of two thousand, and for every stroke the valve must act just at the right time to reverse the flow of compressed air in the tool. Pneumatic chippers are made in various sizes for different classes of work. The pneumatic grinder is operated by a three or four cylinder air motor exactly the same as that used in the pneumatic drill.

A point that should be mentioned in connection with the use of compressed air in the foundry is the advantage of the use of this medium from the point of view of dust. The average foundry is about the most dusty place one could well imagine, and all equipment must be pretty well dust-proof or it will not last very long. Now all air-operated equipment has an exhaust to the air, and if there are any leaks they will be from the machine, not into the machine. Pneumatic tools and air hoists are made



DIRECT LIFT AIR HOIST SWING LATHE.

dust-proof, but even if they were not made dust-proof the air pressure would be sufficient to prevent dust reaching the interior of the machines.

Machine Shop—Air Hoists, Pneumatic Tools, Air Chucks, Etc.

Pneumatic tools find two main applications in machine-shop practice—in the vise department, and in assembly. All vise work includes a considerable amount of chipping, and this can, as a rule, be done better by the pneumatic chipper than by hand. In the assembly department, particularly where machines are at all bulky, there is work for pneumatic chippers, grinders, and drills. The work of the chippers and grinders is similar to their work in the foundry, removing fins, smoothing down corners, and giving that finished appearance that counts unconsciously with the purchaser. The pneumatic drill is handy on account of the fact that it is so readily portable. The main drilling of a shop is done, of course, on the ordinary drill-presses, but as a rule there are some of the holes that can be more conveniently done with the small portable pneumatic drill.



LITTLE DAVID DRILL AT WORK ON WOODEN SHIPBUILDING.

Air hoists have one of their main fields in machine-shop work serving machine-tools. As a rule the direct-lift hoist is best adapted for the medium sized tools, and the motor type for the heavier boring mills, etc., though the Canadian Pacific Railway, for instance, in their Angus Shops, Montreal, use the direct-lift type for some very heavy machine-tools—there is quite a vista of air hoists in these shops. The air hoist serving the machine-tool saves a great deal of time, and one man can run a machine without having to call on a mate for help every time he moves a heavy casting. It would scarcely pay to instal air hoists for machine-tools smaller than a 16 in. swing lathe—we do not advocate compressed air as the universal cure-all—but where the weight of the pieces handled is much over 50 lbs., the air hoist certainly saves money.

The war developed the air-operated chuck and mandrel for lathes. The writer made a number of time-studies on the Jenckes copper-band turning lathe for shells, which had an air-operated clutch with combined control. The average time for six-inch shells, table to table, was 28 seconds for a number of shells; in order to allow plenty of leeway the advertised time was made 40 seconds per shell—and the advertiser was not "drawing the long bow." In the six-inch shell shop of the Canadian Ingersoll-Rand Company, the direct-lift air hoist was used in a rather novel way as a "quick-return" on the boring machines. It was found that a four-inch hoist placed horizontally at the back of the machine, and yoked to the boring carriage was amply powerful enough for the purpose, and relieved the machine operator of a good deal of hard work with very little expense. Still another use for compressed air in this particular shell shop, and one that gained the official approval of the Imperial Munitions Board was the adaptation of the pneumatic drill to driving the screws of the shell boxes. These boxes had ten screws each, to be driven after the shell had been loaded in; the writer's time-studies average thirty-five seconds per box. And, by the way, there is no reason why this particular use for the pneumatic drill should disappear because the war is over.

Shipbuilding

It is no exaggeration to say that compressed air played a very important part in winning the war, the modern shipyard uses compressed air in very large quantities, and the speeding up of shipbuilding that took place in Canada, Great Britain and the United States in the last two years was due largely to the increased use of compressed air. The Hog Island shipyard of the U. S. Emergency Fleet Corporation, for instance, was equipped with the second largest compressed air plant in the world, with a total air capacity exceeding 80,000 cu. ft. per minute.

The use of compressed air in shipbuilding brought most into prominence is riveting. A large steel ship requires a million or more rivets to fasten together frames and plates; nowadays these are practically all driven by the pneumatic riveting "gun." For some classes of riveting, in plate shops, for instance, the hydraulic "yoke" riveter is used to advantage, but this machine is bulky, and not readily portable, so that it has little application in shipbuilding practice. There are many requirements for good riveting. "The holes must be in line, the plates must be well bolted together, the rivets must be hot enough to expand and fill the hole the entire length when driven, the holding-on device must hold the rivet firmly in place," etc. The riveting hammer for shipbuilding work weighs about 20 lbs., and contains a steel piston about 1 1-16 in. x 2 1-2 in. or 3 in., with a stroke of 6 inches. For "button-head" rivets a cup-shaped "set" is used which forms the head of the rivet while it is being driven; for "flush" rivets on decks, etc., the "rivet-set" is flat, and the rivet is first battered down, and formed by moving the riveting hammer around the head of the rivet. Although riveting by means of the pneumatic hammer is remarkably speedy, it must not be too fast or the rivet will not have time to shrink properly and fill the hole as it should; which fact makes one a little suspicious about some of the marvellous "records" that used to appear in the newspapers last year.

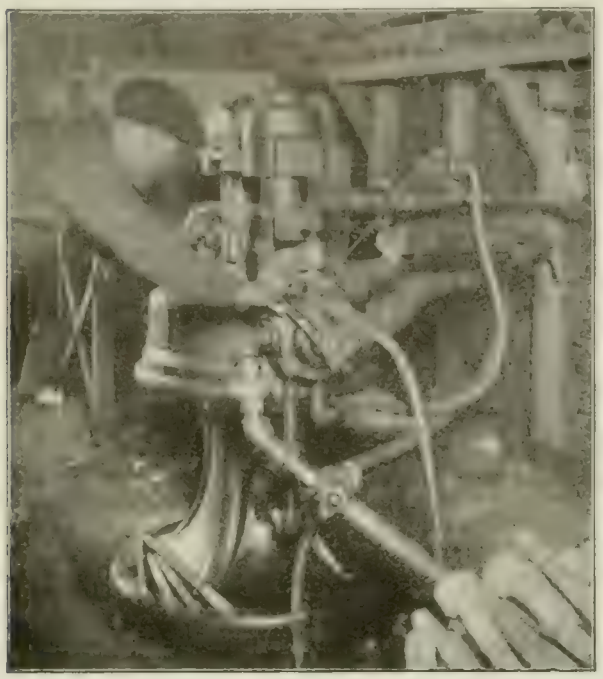
A. Mason MacFarland in his article on "Pneumatic Riveting Practice," which appeared in CANADIAN MACHINERY for April, 1918, has a pretty good story of the way in which riveting impressed a fair Vassar graduate who was visiting a shipyard. After seeing the rivet driving, she was asked what she thought about it: "It seems so foolish," she said, "to make all those little holes and then fill them up again!"

Among the factors of successful riveting mentioned above, that of correct lining up is important. In very rough riveting practice the holes in the plates are punched in the shop, and may not line up very well when the plates are actually erected. To secure correct alignment the modern practice is to punch the holes smaller than the final size, and ream them to correct size after erection, with pneumatic drills. This is, of course, expensive, but as the gain in strength in the riveted joint is estimated to be over 20 per cent., it is



PNEUMATIC RIVETER CAULKING OAKUM ON SHIP'S DECK, FRASER, FRACE, SHIPYARD.

well worth the cost. Pneumatic chippers are also used for the considerable amount of caulking to be done; for caulking oakum into wooden decks a special pneumatic tool is used. Among Canadian shipyards using this pneumatic caulker for ships' decks may be mentioned Fraser, Brace and Co., of Montreal. The same company has followed the lead of American shipyards in using an air-cperated bolt-header adapted from the drill steel sharpener of mining practice. American practice shows that this machine is capable of turning out from 200 to 400 bolt-heads per hour as regular performance, and a variety of small forgings can easily be made on the same machine by using suitable dies.



LEYNER PNEUMATIC BOLT HEADER FORGING HEADS IN

Pumping By Compressed Air

Air lift pumping is not so well known as it should be. While not the most economical form of pumping point of power used, this system has very striking advantages for certain services. In the first place the system is simplicity itself, the whole outfit at the well consisting only of two pipes, an air pipe and a water pipe with a few fittings. The compressed air is supplied from an air compressor which need not be near the well and can conveniently be placed in an existing power house. This simplicity makes the air lift system ideal for isolated plants, villages, etc., for their water supply; for instance, Bishop's College, Lennoxville, Que., is supplied with its drinking water by an air lift taking water from a well 400 ft. deep, and enjoys much more healthy and better tasting water than the village of Lennoxville close by.

In air lift pumping the compressed air does not force the water to the surface as liquids are pumped from tank to tank in displacement pumping. The air is forced to the bottom of the well and mixes with the water forming a foam of bubbles, which is lighter than the water in the surrounding rock and is forced to the surface by the weight of the water surrounding it. To be successful the air must be thoroughly mixed with the water, and all air lift systems have special mixing chambers in which the air is delivered in very small bubbles. Another advantage of air lift pumping is that the water is automatically aerated, which improves it considerably for drinking purposes. In the Bishop's College installation the air compressor is in the main power house two or three hundred yards from the well, and the engineer needs to visit the well only once a week or so to inspect the casing and valves.

Displacement pumping by compressed air is used to a large extent in chemical plants to transfer acids and corrosive liquids; it is also useful for moving liquids containing grit or sand, as there are no moving parts to clog. In the acid plant of the Nichols Chemical Company at Capelton, Que., two compressors run continuously for this service alone; one of the chief advantages of this system of pumping is that in intermittent service a large volume of liquid can be moved very quickly by using the storage capacity of a large air receiver.

An increasingly important application of compressed air in the use of air jet for different purposes. In the first place oil and powdered coal are becoming more and more important as fuel for steam boilers. These cannot be successfully used without a special form of burner, which blows the oil or coal into the furnace, at the same time thoroughly mixing it with air. A large number of burners have been patented for both types of fuel, all, however, include some form of air jet, using either high or low pressure air. The air jet is also very useful in automobile factories for spraying paint and varnish; a number of largest plants paint all their motor cars in this way. In chemical plants, tanneries, etc., textile mills, etc., the air jet offers a simple method of agitating solutions in tanks, and a large amount of compressed air is used for this purpose. For cleaning electric motors, particularly industry surroundings the air jet has no equal; in machine shops the air jet is also handy for different purposes.

Perhaps one of the reasons why the important work of compressed air has been not so well known as it should be is that it has so many applications in so many different trades. For instance, everyone connected with shipbuilding knows all about the pneumatic riveter and drill, but he may not know so much about the importance of compressed air to the mining men, or the uses of compressed air in textile mills, for example. If this short article gives a rough idea of the wideness of the field of application of compressed air it will have accomplished something worth while.

It is only reasonable in concluding an article of this kind, giving the rough outline of what compressed air can do, to refer to the extensive literature on compressed air. Among the larger books there are two of a general nature by Robert Peele and Frank Richards; "Compressed Air for the Metal Worker," by C. A. Hirschberg, of New York, is smaller and more compact. There is also a journal dealing exclusively with compressed air engineering: "Compressed Air," published in New York. All of these are reliable sources of information on different phases of compressed air engineering.



AIR LIFT PUMPING INSTALLATION.

A Discussion on Radiometallography

Being a Few Practical Points From Papers Read at the Joint Meeting of the Faraday and Rontgen Societies. The Possibility of Utilizing X-Ray Examination for Welding is Spoken Of

The joint meeting of the Faraday and Rontgen Societies on April 29, at which there was a general discussion upon radiometallography, created a new interest in the application of X-rays to the examination of hard materials, such as steel and wood. At present, of course, the application of the method to steel is in a preliminary stage, and only thin sections can be radiographed, but there is every indication that before long great progress will be made; indeed, it is not beyond the bounds of possibility that portable apparatus will, ere long, be evolved, by the aid of which material and even structures can be examined in situ. To the inspecting engineer the future in this respect holds out great promise, whilst the saving of time and material will be considerable. We give a few practical points from the papers and discussion, a feature of which was the exhibition of apparatus and radiographs.

Sir Robert Hadfield, F.R.S., president of the society, in his introductory remarks, said it seemed to him that in this method of examination there was a great future for the detection of flaws and imperfections in various ferrous, non-ferrous, and other materials. One of the troubles of the past had been that X-ray examination could only be applied to comparatively thin sections of metal. Some investigators had been able to deal with iron and steel sections up to 4 inches in thickness, and he believed that new apparatus had been completed and was now at work in this country, with which it was hoped to be able to penetrate up to 9 inches thickness. Some time ago he had suggested to Professor W. H. Bragg that it would be most interesting to carry out X-ray examinations of various steels and ferrous alloys in order to ascertain whether their structure showed anything of a special nature. Professor Bragg, having expressed his willingness to do so, a considerable number of specimens had been prepared, as well as specimens of various elements. The latter were as pure as it was possible to get them, although in some cases the purity fell short of the ideal. That was particularly the case with silicon These specimens of iron, nickel and cobalt had been submitted in the hope that study of their structure might lead to some explanation of the differences of their physical properties. It was well known that, notwithstanding the fact that these metals were in the same group in the periodic table, their physical properties were quite different, whilst the heat changes or critical points showed considerable differences. The critical point in nickel was 350 deg. Cent., in iron 770 deg. Cent., and in cobalt 1,100 deg. Cent. By "critical point" was meant the temperature at which each of the metals changed from magnetic into non-magnetic condition. As regards iron, its change was not quite so sudden. There was a loss of magnetic susceptibility at 730 deg. Cent., which did not completely disappear until about 770 deg. Cent. was reached. A similar range might exist with regard to nickel and cobalt, but these two elements had not yet been so carefully examined. Another curious point was that, so far as was known, cobalt, alloyed with iron, does not give a non-magnetic material. In the case of manganese steel, upon adding manganese in sufficient quantities, say 12 per cent. and upwards, notwithstanding the presence of some 80 per cent. of iron, the material became non-magnetic. In some way, between 24 and 26 per cent. of nickel made iron non-magnetic, but no alloy yet made of iron and cobalt appeared to be non-magnetic, which was rather a curious point, except that, of course, the much higher critical point of cobalt no doubt decided this point.

Professor Bragg then delivered a very interesting lecture on the elementary principles of radiometallography, and indicated the practical possibilities of this method of examination.

Lieut.-Col. C. F. Jenkin said that considerable claims had recently been made for X-rays as detectors of hidden flaws in steel. The only flaws in which he was interested were the hair cracks, which gave considerable trouble in aero engine crank shafts, and although there seemed to be no likelihood that X-rays could reveal them, he was persuaded to test the matter practically. Samples were therefore examined. They were pieces cut from crank shafts with large and relatively obvious flaws, but no trace of defects was shown by the X-rays. One sample, about 2 cm. thick, was cracked right through the thickness for a length of about 6 cm., but there was no evidence of the crack in the radiograph. If such large flaws could not be detected it was obvious that the method was useless for finding hair cracks.

Mr. Eugene Schneider, president of the Iron and Steel Institute, described in a paper the directions in which the method of examination by means of X-rays has been applied at the Creusot works. The general conclusions drawn from the work so far carried out are that in our present state of knowledge of X-rays and their production, the application of radiometallography enabled an examination to be made of ordinary steels, provided their thickness did not exceed 40-45 mm. This limiting thickness was reduced when the steel contained at least one constituent of higher atomic weight. It would be of inestimable value if ingots of 20 cm. could be radiographed, but unfortunately we had not yet reached that stage. Nevertheless, every step in the direction of finding a detector more sensitive to X-rays than those already known would lead to progress in radiometallography. Similarly, as the means of producing X-rays of high penetrative power were improved it would be possible to increase the scope of X-rays in the examination of metals. An interesting application of radiography referred to in this paper was as an aid in sorting out mixed bars of metal, obviating the necessity for a chemical analysis. If, for instance, carbon steel bars had been mixed with tungsten steel bars, they could be sorted out speedily. Bars of unknown composition and a bar of standard steel in these circumstances, could be placed on a slab, a radiograph taken, and the opacity associated with each bar measured. The values obtained could then be compared against a chart drawn up for steels of known composition and permitted of a deduction as to the nature of the various bars. Investigations have been carried out by means of X-rays at the Creusot works: (a) Into segregation and blow-holes and the influence of aluminium upon case steel; (b) The examination of steels containing different percentages of tungsten; and (c) the examination of compound steels.

The application of radiography to the examination of timber, both in the raw and finished state, was dealt with by Major G. W. C Kaye, with special reference to timber for aircraft work. In doing so, Major Kaye drew attention to the low efficiency of the apparatus now in use for dealing with steels. The efficiency of the X-ray tube, for instance, was of the order of one-tenth of 1 per cent. Similarly, the induction coil had a low efficiency, and a tremendous amount of work had yet to be done to improve X-ray apparatus.

In a joint paper by Sir Robert Hadfield and Messrs. S. A. Main and J. Brooksbank, reference was made to the possibility of utilizing X-Ray examination in connection with welding to ascertain the soundness or otherwise of the welds. The expense of the apparatus was admitted to be heavy at present, and its operation suited rather for an expert than for routine purposes. Attention was also called to the fact that at present X-ray examination does not magnify defects; hence its utility is limited to those defects which are of a size within the visibility of the naked eye. Consequently, as many of the defects in steel arise from microscopic causes, we must stil rely for their elucidation on micrography.

Another paper by the same authors described some work in connection with the

*From "Practical Engineer."

radiographic examination of carbon electrodes used for electric furnaces. The investigation was carried out in view of the trouble experienced with these electrodes in practice, and it was thought that radiographic examination might help to show internal causes accounting for their inconsistent behaviour. A number of electrodes from different makers were obtained, but the authors confess that not much light was thrown upon the matter. Whilst the work which was carried out was of great value to Messrs. Hadfield's, it is suggested that the best use of radiographic examination in this connection would be during electrode manufacture where variations of composition, baking temperature, etc., could be experimented upon step by step in the process.

Dr. C. A. Edwards (Manchester University) drew attention to the very great bearing which this work would have upon the future of all metallurgy, not only from the practical side, but also from the theoretical side. It was a great pity from the scientific point of view that the war started just at the moment when Professor Bragg had got out his important work, and he hoped that he would quickly get back to it on metallurgical lines and give metallurgists further important results.

Captain Jackson, Admiralty Inspector of Steel in Sheffield, said he had come to the meeting hoping that he would hear something which would be of practical value in dealing with the inspection of naval ordnance, more particularly in investigating cracks in material. Inspectors of such material desired to pick out flaws and to examine material very rapidly. An enormous amount of material went through their hands, but they had only been able to examine the surface of it in the ordinary way. The application of X-rays, however, would enable them to check whether there were internal flaws in the material without it being necessary to keep any permanent record of the observations, except in cases of defect or suspicion of defect. After listening to Professor Bragg, he almost hoped that they would be able to determine whether there were flaws by merely passing the material before some form of screen, and by the shadow on the other side to reject or pass it straightaway. There was one very important development which apparently had not yet been reached, and that was the examination of heavy forgings. One of the troubles with heavy gun forgings was the question of small defects in the steel, particularly nickel-chrome steel. With this steel there were typical flaws which did not always appear on the surface. Perhaps it was found that in turning a gun forging certain flaws appeared. With further turning they disappeared, but other flaws made their appearance. When they came to the finished gun forging, perhaps there were no visible flaws, and then the inspectors had to make up their minds whether there were any flaws in the forging or not. As they could not see any they had to say there were none. In order, however, to accept forgings under these conditions, and so as not to run any risk in doing so, it was necessary to have a large margin of safety in the design, whereas if they could be perfectly certain that there were no flaws, that margin could be reduced. A large margin of safety meant unnecessary strength, the article was heavier than need be, and there was waste of material and waste of efficiency. Consequently, if X-Ray examination could be developed so that it was possible to thoroughly examine thick steel forgings to ascertain whether there were any flaws in them or not, it would be of great practical advantage in the development of ordnance. There was another direction in which such a method would be valuable. During the times of pressure through which we had recently been, the assembling and inspection of fuses had to be carried out with great rapidity ,and there was always the possibility of important components being left out. In two particular instances which came under his notice it was wanted to know whether components had been omitted from certain fuses, and X-ray examination would have enabled him to have examined the fuses without the trouble of having them taken to pieces to find out, and then having to reassemble them again. He did not know at the time that X-ray examination was a practical proposition, and the work involved was enormous.—"The Practical Engineer."

The "Engineer" publishes some concise data on the R 34's journey worth repeating. They comment as follows:

"The double journey across the Atlantic to America and back, of the Clyde-built rigid airship R 34, following within a month a non-stop aeroplane flight from Newfoundland to Ireland, represents a triumph for British aeronautics of no mean order. From the utilitarian point of view we may not have gained much from either flight, and from the commercial standpoint we may have demonstrated nothing except that the regular passage of the Atlantic by air is still too costly and uncertain to contemplate seriously. On the other hand, the flights have shown in an incontestable manner the vast progress which aeronautical design and construction have made in this country during the past few years. In both instances everything about the aircraft was entirely of British production, from the engines to the wireless equipment, from the metal of the airship's framework to the linen of the aeroplane's wings. The flight of the R 34 under the command of Major G. H. Scott was begun from the East Fortune Aerodrome at 1.48 a.m. G.M.T. on the 2nd of the month. After a comparatively uneventful journey—nothing worse occurred than the cracking of a cylinder water jacket, which was repaired with a piece of copper sheeting and chewing gum—the airship arrived over Newfoundland at about 2 p.m. on the 4th. Although the petrol carried amounted at the outset to 4,900 gallons—nearly 16 tons—the fuel supply began at that period to give some grounds for anxiety. Nevertheless the journey was continued, and in the end the airship landed at Mineola, Long Island, at 1.54 p.m. G.M.T. on the 6th with a petrol supply sufficient only for 40 minutes' further flight. The total time occupied on the journey of 3,130 sea miles was 108 hours 12 minutes. The number on board was 31. The airship was moored in the open, and as a result of straining at the mooring cable some slight damage was caused to the nose end. Temporary repairs were effected, and at 4.55 a.m. G.M.T. on the 10th the airship, after cruising over New York, left on her homeward journey, carrying 4,600 gallons of fuel. Favored by a following wind, the trip was carried through expeditiously, although one of the five engines was put completely out of action by the breaking of a connecting-rod. Clifden was reached at 8 p.m. on the 12th —61½ hours after crossing the American coast at Long Island, and at 6.57 a.m. on the 13th a landing was made at Pulham Aerodrome, in Norfolk, with 1,000 gallons of petrol still unused. It was originally intended that the vessel should return to its starting place, but the bad weather in Scotland rendered that course inadvisable. The homeward return journey occupied 3 days 3 hours and 3 minutes.

It has long been known that as the result of spontaneous combustion fires often originate in the interior of large coal piles, especially when the coal is fine and contains a large percentage of sulphur. Some of the recent coal-pile fires have demonstrated, however, that under favorable conditions spontaneous combustion is liable to take place even in piles composed of coal in large lumps. It depends principally upon the nature of the coal and upon the amount of rain to which the pile is exposed.

John A. Thomas, of Columbus, O., who made a special study of spontaneous combustion, is the originator of a simple and effective method of extinguishing such coal fires. The application of his method has prevented enormous damage in several instances, where fire had originated in large accumulations of coal.

Mr. Thomas uses a strong solution of bicarbonate of soda, which he throws upon the burning coal-pile by means of a force pump. The carbon dioxide released from the soda puts out the fire. The gas is assisted by the water which, by the heat of the burning coal, is transformed into steam.

By merely modifying wing curvature, aeroplanes of to-day could be made to fly at a speed of 250 miles an hour, according to a British captain who is considered an aeronautical authority. The obstacle that this would present, however, would be a minimum landing speed of about 150 miles an hour. Greater speed in the air is much to be desired, but no pilot is particularly anxious to bring a machine to earth at a rate such as that indicated.



WHAT OUR READERS THINK AND DO

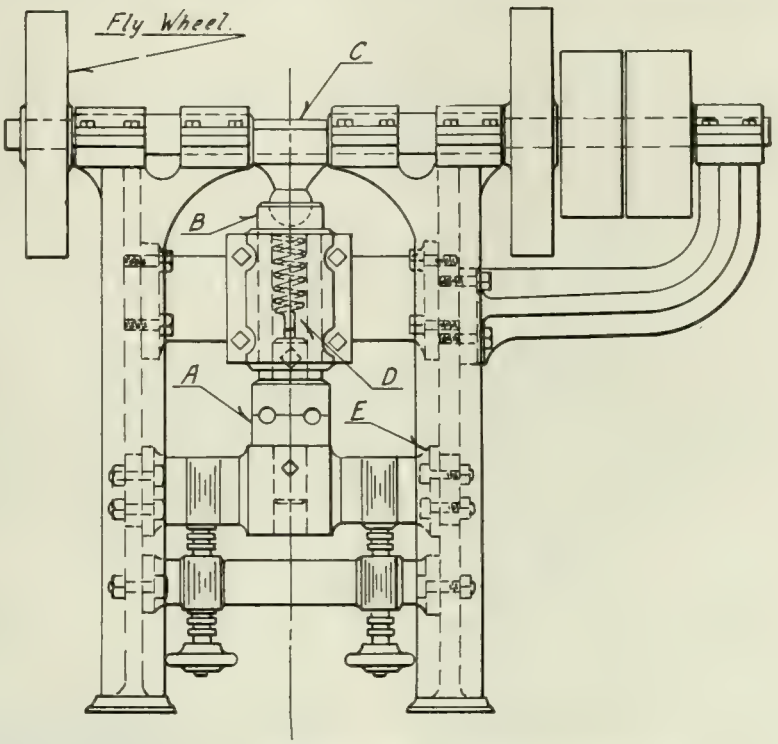


SWAGING MACHINES FOR SMALL SHAFTS

By GEORGE BARRETT

THE accompanying illustration shows a machine designed for swaging buggy and automobile shafts, textile machine spindles, and other work of a similar nature. The anvil block is secured in a cross bar that is bolted to the side supports of the machine. By means of two large square thread screws, the cross bar with the lower swage block is adjustable to the various sizes of dies. The top die is secured in the ram B, which is operated by the eccentric C on the main shaft. On the lower end of the eccentric sheave is a ball that fits into the bearing on the upper end of the ram B. The drive shaft is thrown off centre about ⅜ of an inch, which gives a working stroke to the ram of ¾ of an inch, and a speed of about 1,200 strokes per minute.

There is a key D driven through the central ram bearing, a slot in the ram being made for the vertical movement. The purpose of the key is to provide a thrust for the centre spring, the reaction of the spring being utilized to keep the ram pressed firmly against the ball. The key also serves to maintain alignment of the dies. The machine is belt driven and the shaft is provided with two heavy fly wheels which assure steady action when forging or swaging is in process.



GENERAL VIEW OF THE MACHINE.

FIRST-CLASS FLEXIBLE GRINDER IMPROVIZATION

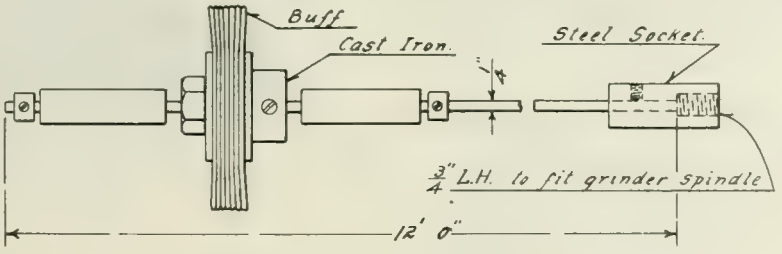
By Donald A. Hampson

We had buffing wheels and rouge, and did more or less polishing of a general nature, in fact we considered ourselves pretty well fixed for this kind of work, but a job came along one day that was beyond us, though it was really very simple with the proper tools. The piece was a built-up device for use in food production—a part about the size of a motor truck radiator, with a nearly-continuous sheet brass shell surrounding, and weighing in the neighborhood of two hundred pounds. This exterior brass surface had to be polished and buffed after the final assembling.

If there had been any kind of a flexible shaft in our equipment it would have been just another everyday job of buffing, but there was not, and we had to get the same results with some sort of a makeshift because the work was not of a size or shape to permit its being presented to a revolving wheel in the usual way.

The drawing furnishes details of the "flexible shaft" outfit that was made up—and at no great cost, either. A 12-foot length of ¼ in. cold-drawn steel was set into a socket, or nut, that was threaded to screw on the free end of the Garvin tool and cutter grinder. Five-sixteenth inch holes were drilled through two 6-inch pieces cut from the handle of an old floor broom, these making the workman's handles with which to guide the buffing wheel. A piece of cast iron was turned up and threaded for a standard nut; between this nut and the shoulder of the cast iron piece the buff was held, sufficient grip and stiffness being provided by two flanges of ⅛ in. sheet steel sheared out. As will be seen, this wheel holder receives its drive from the shaft by the safety set-screws, and the roughest kind of collars retain the handles placed either side of the wheel.

In operation, the long length of the small shaft gives the desired flexibility. Use on other work than this one job has proved the rig to be worthy of more than passing notice. The work itself was supported on horses when polishing the broad sides and rested directly on the floor for polishing the edges. While there was some misgiving as to the "whip" of this slender shaft running at a high rate, no trouble was experienced—a one-hand grip would have answered

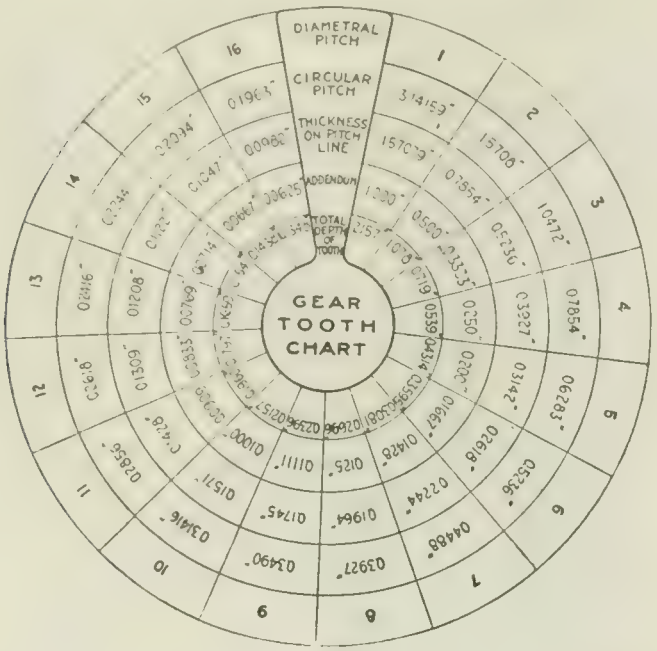


IMPROVISED FLEXIBLE SHAFT FOR BUFFING.

every purpose, except that of production. As a precaution, a hook was provided for the workman to place the shaft in when not buffing, and a support well weighted was placed midway up the shaft and limiting the shaft to a ring 6 inches diameter at that point. The work turned out was satisfactory in every way and the scheme served the purpose without any delay in getting equipment from a distant point—which we did not know at that time would ever be required again.

part at XY had to be machined from the base, gripping the casting (aluminum) in a 3-jaw chuck as per sketch. The following are the particulars of a special tool made to overcome the difficulty. The machine was an 8-in. capstan. The body A is of 2-in. square mild steel turned down on the shank end to fit the capstan head and turned down on the other end to clear the bore in the casting. A ½-in. slot ¾-in. deep was milled along the body to enable the combined tool-holder and form bar B to move up and down, pivoted at Z with a ¼-in. pin, the movement of the tool-holder being limited by the end of the slot milled in the body, with the spring and ball D to keep it rigid. The method of operation is as follows, the tool in the holder being sufficiently short so that it just cleared the parallel part of the bore and commenced cutting on the taper part. The form plate E was fixed in a special bracket on the cross slide. To take a second cut, all that was required was to move the carriage slightly back towards the capstan head, thus making the tool take a deeper cut. A small hardened cast steel roller, fitted in the end of the form bar B, facilitated the movement on the form plate E, which was made of cast steel hardened.

The tool was in every way successful. The cutting tool itself was ¼-in. square high-speed steel.



GENERAL APPEARANCE OF THE CHART.

A HOME-MADE GEAR CHART

By J. H. Moore

The writer during his drafting experience had considerable gear calculating to do, and naturally got fed up with looking up the tables, formulae, etc., so he devised and made the gear tooth chart shown in the accompanying illustration.

The figures are so arranged that they represent the values of the different diametral pitches.

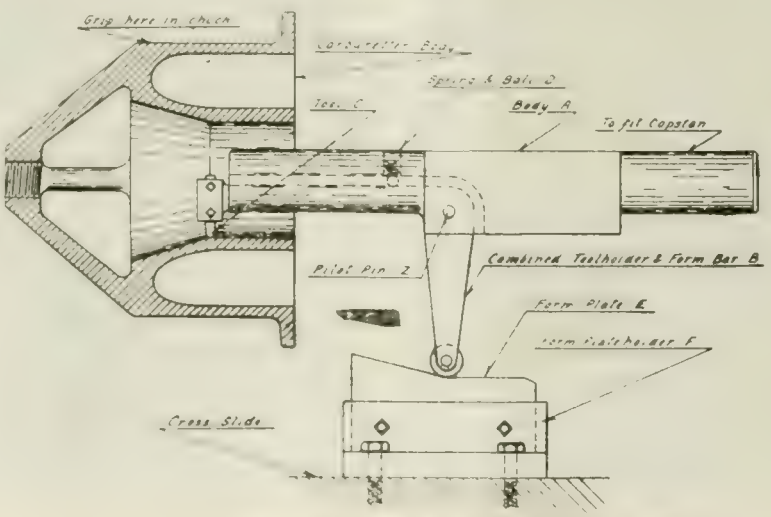
By moving the centre piece to the pitch desired, all the other necessary dimensions can be read at a glance.

Readers will readily understand the saving of time by the use of such a chart, so as the time necessary to make one of these is a mere nothing, compared with the time saved, they cannot do better than get busy and make one for themselves.

SPECIAL RADIUS-FORMING TOOL FOR CAPSTAN AND TURRET

By G. Blake

The writer, during the war, had to undertake the machining of carburetter parts for aircraft, one of the main parts shown on the sketch, presented difficulties in the way of machining. The taper



TAPER FORMING TOOL FOR TURRET LATHE.

Renewing Operations.—The plant of the Dominion Alcohol Company, at Wotton, Wolfe County, Quebec, will resume operations after a shutdown of six months. The demand for charcoal and wood alcohol, which this firm manufactures, has become very heavy recently.

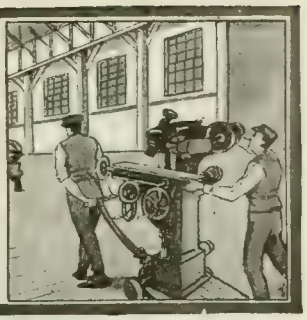
A fuel-saving measure, which Iceland authorities have found to be very satisfactory, consists in baking bread in a special bakery connected with the local gasworks. The waste heat from the gas plant is used to warm the ovens.

It is a common occurrence for a tap to break when tapping hard metal. If the tap is ground away on the point, so that the first five or six threads will be gradually bevelled, the risk of breakage may be largely avoided. The effect of grinding the end of the tap is to break up the chips into smaller pieces and thus prevent clogging the threads of the tap. This will be found to be especially advantageous in tapping very hard rolled steel.

Here is a little information which will help you to solve the vexing problem that is apt to be a hardy annual, i.e., how much coal to order in order to fill the bunkers, but without having to put some in an old barrel in the outhouse. A ton of egg coal contains from thirty-two to thirty-eight cubic feet, averaging about thirty-five. By measuring the cubical contents of your bin you will be able to estimate how much to order to fill them. This may be done by multiplying together the length, breadth and depth of your bin.



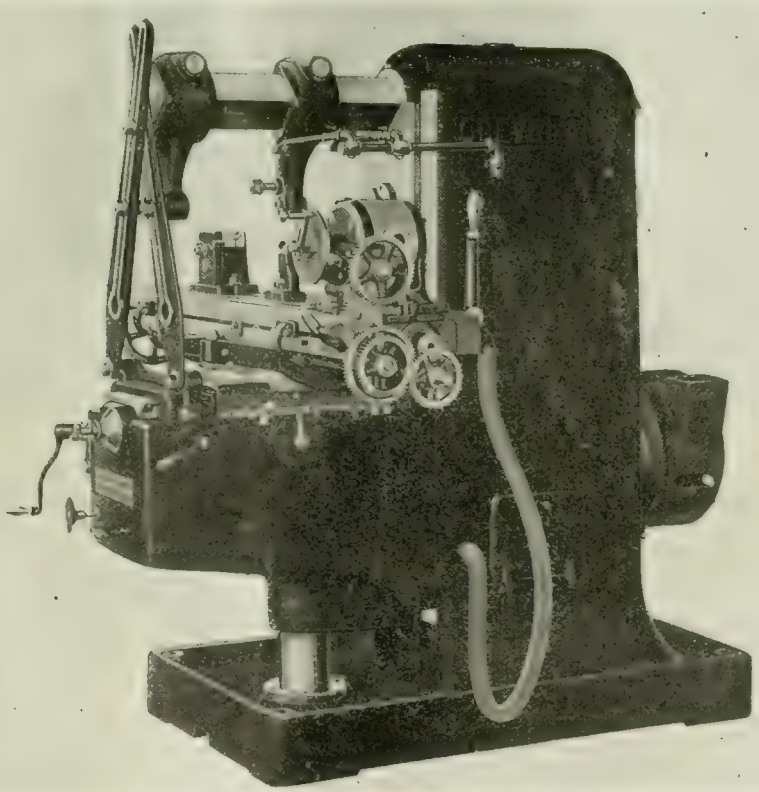
DEVELOPMENTS IN SHOP EQUIPMENT



UNIVERSAL MILLING MACHINE

THE Cleveland No. 1 universal and plain milling machines are of the constant-speed driven type, with 16 changes of feed and of spindle speed. Speeds and feeds are controlled by two levers of the ball-joint type, similar to an automobile gear shift. Changes for both speeds and feeds are obtained through sliding gears which are automatically lubricated. The square overarm and many other improvements are features. The illustration shows clearly the design of the universal type. The column is a complete box section of rigid construction. The base and column are cast in one piece to form a heavy ribbed semi-steel casting, tied together with vertical and horizontal walls. The only openings in the column are those necessary for the change gear levers on the front, the pulley drive housing in the rear, and the cutter lubricant tank on the left side of the machine. Opening of the column is absolutely unnecessary. All the interior parts are lubricated automatically, and all adjustments on the bearings are made from the outside. The dovetail knee slide extends upward to the overarm, thus affording ample surface for clamping the attachments. The depth of the column has been carefully determined in order to place the spindle and the shaft bearings in proper relation to each other to secure maximum rigidity. The dovetail slide on the face of the column is so constructed that the heaviest pressure is not taken at the thinnest section of the column wall as is often the case in milling-machine construction. The horizontal wall separating the lubricating oil reservoir from that of the cutter-cooling compound is designed to give added rigidity to the column. The lower surface of the base is finished to give it a firm foundation, while the contour of the upper surface is pan-shaped with depth enough to catch oil and chips, thus keeping the surroundings clean.

The knee of the machine is strong enough to bear any weight which may be placed on it while doing the heaviest work and has an improved dovetail slide. The bearing of the saddle is not on the thinnest section of the dovetail slide, but on the flat, wide surface, the narrow slide acting as a guide only. There is no bearing in the top of the dovetail guide, which eliminates the possibility of marring due to the operator laying tools on the top of the knee. The bearing of the knee on the column is carried well above the top of the saddle slide, thus giving the knee a longer bearing on the column and reducing the bearing pressure to a minimum. The feed box, as well as the knee, is entirely closed to eliminate the possibility of chips getting into the feed mechanism in the knee. The elevating screw is large in diameter and in one piece. By the use of the post the telescopic screw has been eliminated, the post acting as a support to the elevating nut and as a guide in the knee. The screw is operated with a double bevel gear, hand-feed and power-feed being independent of each other.



UNIVERSAL MILLING MACHINE.

Designers of machine tools find the table and saddle of a milling machine a most trying problem, as these parts are subject to tortional as well as bending moments; therefore these must be designed to resist continuous strains and also maintain their original accuracy. The table of the Cleveland milling machine is machined all over to insure proper alignment, as a table finished on one side only may warp. The bearings on the table are at the top of the saddle instead of at the bottom of the dovetail, a method which secures a large bearing surface and locates the bearings at a greater distance apart. These bearings are automatically lubricated by rollers in the saddle. The bearing on the saddle is also at its widest portion, and both saddle and table bearings are taken up with long taper-gibs which are provided with adjusting screws at both ends.

The square overarm provides positive alignment of the arbors and maximum rigidity of the arm pendants. If the arbor is not exactly true and the arm pendant is brought into place by the operator to accommodate the arbor, the arbor is working in a cramped condition and may break. With the square overarm it is impossible for the operator to place the arbor supports on the overarm and on the arbor in any other way than exactly in line. This simple principle of the square overarm eliminates the possibility of any revolving movement of the pendant and also gives greater bearing surface in column and pendants.

The flanged spindle does away with the overhang on the end of the spindle

as well as the trouble caused by cutters screwing fast on the spindle, and also allows the cutter to be run in either direction. On the flanged spindle is a face keyway, inserted into which are hardened steel jaws for driving arbors and face mills. It is unnecessary to remove these at any time to change from a face mill to an arbor, as the driving is done by the hardened steel jaws. The strain is, therefore, taken off the taper hole. The spindle is provided with a positive lock that enables the operator to loosen the arbor nuts with the least possible difficulty, and is also provided with a handwheel to revolve the spindle, a feature which the operator will find convenient on boring jobs and other milling operations. The spindle lock cannot be operated while the machine is running, nor can the main driving clutch be thrown in while the spindle lock is in this position. The bearings on both the front and rear of the spindle are taken up with a nut on the outside at the back end of the spindle.

All bearings in the column and knee are thoroughly covered with lubricant while the machine is running, thus relieving the operator entirely of the responsibility of oiling the most important parts of the machine and eliminating the necessity of oil holes in any of these parts. This system is highly efficient and is entirely automatic. The reservoir containing the oil has to be filled but twice during the year. As high-speed steel cutters are used almost entirely on milling machines, a reservoir of ample size for cutter-cooling lubricant has been provided. This medium is circulated by a centrifugal pump, which operates only when the spindle does, therefore it is not necessary to shut off the cutter lubricant when changing work or when stopping the machine to measure it. This pump operates automatically when the clutch is thrown in and the machine is running, and supplies a heavy flood of coolant at low pressure to avoid splashing and permit its use in the most ample quantities.

Speeds and Feeds

The speed and feed arrangements are both of the sliding-gear type. All sixteen changes of speeds, as well as feeds, are made by two levers located conveniently for the operator. The spindle speeds are sixteen in number, in either direction, and the feeds are sixteen in number, in either direction also, so that this machine will efficiently handle all classes of cutters. Speeds and feeds being in geometrical ratio, the correct changes of speed and feed for the work to be done can be made without trouble. All gears and shafts in the drive, as well as the feed, are of hardened steel, automatically lubricated, running in bronze bearings and protected against breakage by a safety device..

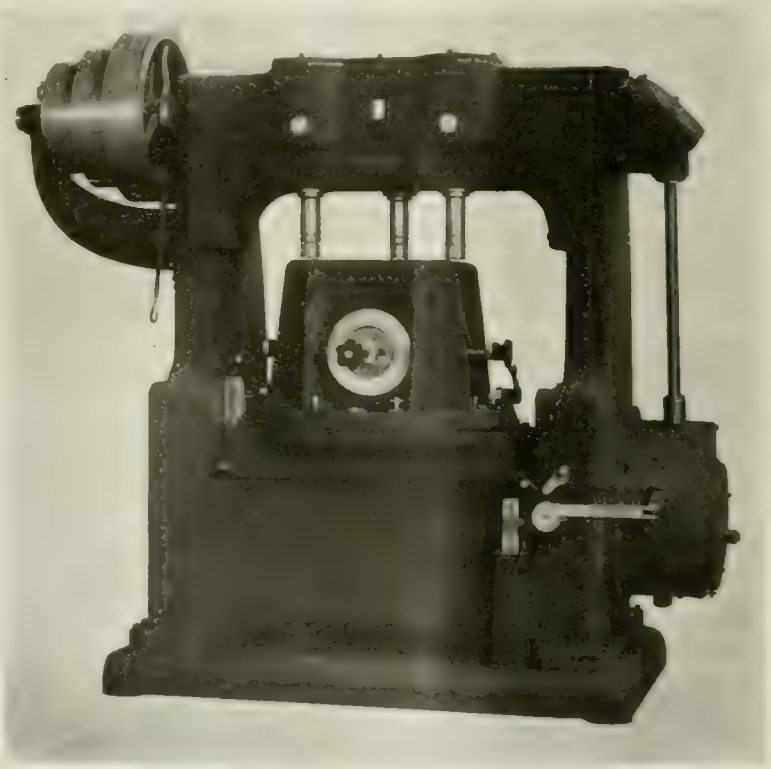
Power is transmitted through a constant-speed drive pulley and the machine is so designed that it requires no loose gears on the spindle. All shifting of gears is done on the secondary shafts below the spindle. The objectionable feature of the tumbler in both the main drive and feed works has been eliminated. The starting and stopping lever can be operated from both sides of the machine and the single pulley running at constant speed for the drive is protected by a belt guard, so constructed that it can be adjusted to any angle and any added extensions. The spindle reverse is contained within the machine so that right or left-hand cutters can be used, and all the speeds, feeds and other driving mechanism are self-contained within the machine. All power gear shafts between the drive shaft and the main spindle are in a vertical line to eliminate all side thrusts in the column casting. These machines are manufactured by the Cleveland Milling Machine Co., Cleveland, Ohio.

CYLINDER BORING MACHINE

THE illustration shows a new vertical gas-engine-cylinder boring machine equipped with a circular indexing jig that is a recent product of the Defiance Machine Works, Defiance, Ohio. The speed and feed mechanisms of this machine are somewhat similar to those incorporated in other machines built by this concern, but the rotating-jig fixture, together with the arrangement of the spindles, is said to be a new method of boring gas-engine cylinders. This method allows the machine to produce constantly and saves the time ordinarily lost in loading and reloading the fixture. The machine is a single-purpose tool and is built in three sizes, taking 36, 48 and 60 in. between the housings. The machine can be fitted with either two or three spindles or with two or three groups of spindles. When fitted with three groups of spindles it will rough-bore, semi-finish and ream gas-engine cylinders of either single units or a number of units cast en bloc, these three operations being accomplished at one time. The circular indexing jig is designed to hold four units, this method of construction allowing the three above-named operations to be carried on at the same time the operator is unloading and loading at the fourth station.

Lubrication is secured by means of a force-feed and splash system, this being made possible by the all-enclosed feature of the machine, both the feed and drive mechanism being tightly encased and practically submerged in a bath of oil, while the bearings are lubricated through individual leads from a force-feed mechanism.

The unit method of construction is followed throughout, each unit being accessible without disturbing other parts of the machine. The drive to the spindle is from a three-step cone pulley through steel worms and bronze worm gears, but instead of driving the spindles by means of keys as in common practice, large tongue drives are cut integral with the spindles and mesh with grooves in the worm gears. This construction is located close to the spindle nose and as used in conjunction with the worm gear is said to effect a very smooth and powerful drive which reduces the possibility of torque in the spindle to a minimum and eliminates the chatter of the cutting tools. The spindles themselves are of hammered stock supported in three bronze bearings. The nose bear-



DEFIANCE GAS ENGINE BORING MACHINE.

ings are of conical shape with a means of adjustment, while end thrust is carried on two sets of SKF ball bearings. Momentum of the spindles can be overcome after the power has been shut off by a friction brake located in the drive pulley and operated by a lever within reach of the operator. The boring tools are fitted to the spindles by tapered shanks and are securely held in place by long bolts passing through the spindles, this method of construction eliminating the possibility of the tools being extracted from the spindle on the return feed.

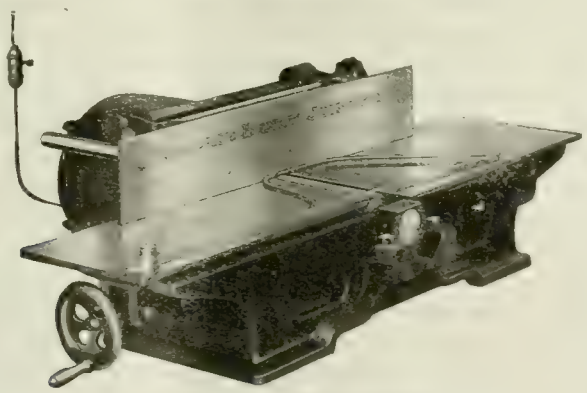
All feed-shaft bearings are bronze bushed, while end thrusts are carried on SKF ball bearings. The feed changes can be made by removing the gear-case cover and changing two gears. A hand adjustment for the table is provided, and when in operation the table feeds the work to the cutters, and when through, the cut automatically reverses on fast travel, returns to the loading position and stops.

The table is raised and lowered by jackscrews, each screw being retained in a jack and actuated by a worm and gear through a bronze nut which is sleeved to the worm gear. Each jack is a unit in itself, and its contents are packed in grease. A means is also provided for adjusting the screws independently to maintain alignment of the table. All thrusts are carried on SKF ball bearings. The jackscrews are located directly beneath the table and a vertical feed is obtained, eliminating side thrust.

The table, column and base are of cast iron, the table being gibbed to the column on both sides. The column and base are of box section, reinforced, and the base rests on the floor at three points only.

WALLACE BENCH JOINTER

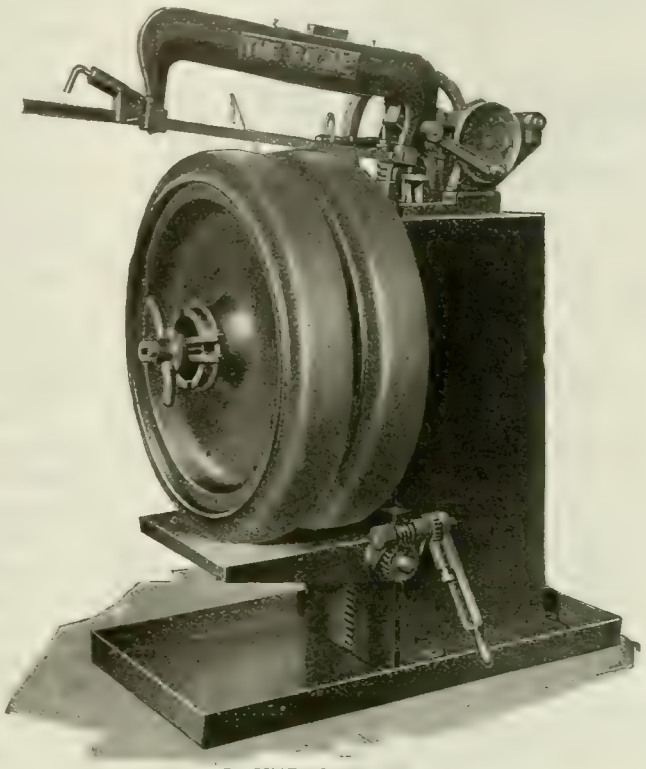
A 6-inch bench jointer which is shown in the accompanying illustration has been developed by J. D. Wallace & Co., 1401-1405 W. Jackson Blvd., Chicago, Ill., for use in working and pattern shops. On account of its smallness and weight, this machine can be readily carried by one man, thus permitting it to be transported to any part of the shop where a machine of this type is required. A feature of the machine is the fence, which is mounted on the motor and slides backward or forward on rods, which allow it to be accurately adjusted. This fence is so designed that only a very small amount of table space is lost when the fence is set for beveling. The motor is connected to the machine in such a manner that the cutter-head can readily be taken out and another head inserted. The tables may be slid away from the cutter-head to permit the use of special heads, or they may be slid forward so as to work with the narrowest possible throat opening. An efficient arrangement of the flap and shutter has been effected by mounting the shutter guard on the cutter-head bearing. The machine is equipped with a motor, lamp cord, and plug for operating from any ordinary lighting circuit.



WALLACE BENCH JOINTER.

RACINE TIRE SAW

The Racine Tool Machine Co., Racine, Wis., has recently developed the hack-saw shown, which is used for removing the steel rims of worn-out truck tires from the wheels. The saw mechanism is mounted on a sturdy base provided with a platform that may be raised or lowered by a ratchet-lever-driven worm, operating a gear in mesh with a rack cut in the base. After the platform is adjusted to the proper height for the wheel being handled, the wheel is locked in place by a bar passing through the shaft hole. The platform may also be provided with a shallow V-shaped top surface to aid in centering and holding the wheel. The saw frame is arranged to hold any size blade up to 24 in. in length by 1 in. in width, and is so arranged that the automatic control mechanism automatically stops the blade when it has finished its cut, parallel to the felloe. The machine can be furnished for either motor or countershaft drive and is provided with a pulley 16 in. in diameter with 4 in. face. It operates at approximately 100 strokes a minute, and will cut a dual tire 17 in. wide from the rim in approximately 10 min. A pump is provided for circulating the cooling liquid during the operation.



RACINE TIRE SAW.

Following are the principal dimensions:

Weight 1,077 lb.; floor space, 24 x 43 in.; distance from top of platform to bottom of blade with platform in lowest position, 44 in.; height of machine from floor to top frame, 5 ft.; blades used, up to 24 in. long and up to 1 in. wide; travel of platform, 14 in.; height of platform above floor when in lowest position, 4 in.; coolant used and circulating pump provided; diameter of drive pulley, 16 in.; face of drive pulley, 4 in.; speed, 100 strokes per minute.

Rub rusty steel with emery paper dipped in turpentine to remove rust. Polish with a fresh piece of emery paper and the result will be satisfactory.

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Oil to the Rescue

GREAT stress is being laid these days on the possibilities of oil as fuel to replace coal. The coal situation is becoming acute in every country in the world, and in Great Britain, where coal has for so long been king, it is felt more than in most places. The recent disastrous strikes, coupled with the constant fall of production due to shorter working hours, has caused widespread alarm among all sections of the population, except perhaps among the striking miners. These are evidently of the same frame of mind as the Irishman who, when being lowered down a well, demanded to be pulled up. He backed up his demand with the statement that if it was not complied with he would cut the rope.

The value of oil has been appreciated for a long time now, but one of the reasons it has not been used more generally for fuel aboard ship has been the lack of suitable fuel oil stations in different parts of the world. This is being rapidly overcome, and if the present boring operations in Great Britain result in the discovery of an adequate supply, the situation will be materially relieved. Oil, whether used as fuel for a steam boiler, or directly in the cylinders of an internal combustion engine, is a much more satisfactory fuel than coal. It is more easily and quickly handled than coal, and its heat value is about one-third greater. Combustion is carried out more efficiently than with coal, and there is an entire absence of smoke. The cruising radius of a steamer fitted with oil burners is considerably more than when coal burning, the crew required is less, and the oil can be carried in ballast tanks instead of occupying space that could otherwise be devoted to profitable cargo.

On shore there are a great number of uses for it. Besides being available for steam-raising purposes, it is the best and most economical medium for supplying heat to metal-working furnaces, for tempering, annealing, enamelling, etc. Mixed with the finer refuse of the coal pit, it makes a colloidal fuel of great value. We may look forward to the next few years for great developments in the use of this fuel, which provides a means of obtaining our power at a much higher rate of efficiency than we have been accustomed to getting with the use of coal. It should not be long before it can be applied safely and economically to the heating of houses, to the great relief of the average citizen of this country of long winters.

Don't See the Danger

HERE is a sample of the material that is being published in regard to prices of food. This does not seem to come in the nature of an explanation as to why conditions were forcing up prices. On the other hand it looks very much like a deliberate notice that on a certain date a mild form of highway robbery was going to be perpetrated:

> Edmonton, Aug. 28—In spite of denials by Montreal and Toronto wholesalers of reports that the price of sugar is to be increased, five cars of sugar were to-day offered Edmonton wholesalers on a basis of 17 cents per pound. The previous highest quotations in this wholesale field was 12 cents per pound. Thus this new quotation for fall stocks shows an increase of five cents per pound. This will represent an increase of at least five cents per pound when it reaches the retailer, and an increase of probably seven or eight cents per pound to the retailer, meaning to the consumer not less than twenty-five cents per pound. A local daily devotes a column editorially to the subject to-day, under the caption of "The Sugar Brigands."

The men who are responsible for this condition of affairs are certainly short-sighted, as any simple ostrich that ever stuck its head in the sand in the presence of danger.

They are not reading the signs of the times, nor are they paying attention to the fact that this is coming to be more and more the day of the common people.

It is almost a lamentable thing to see a man or a body of men still obsessed of the fact that they can go ahead and mulct the people without having to stand up later and tell what they have been doing and why.

Only this week a distinguished Canadian, addressing a large body of representative men, was loudly cheered when he stated that any man or firm that took larger profits during the war than in a normal peace-time year, was a profiteer, and worthy of Governmental attention.

You may call it shrewd business; that sounds well. Others not so kindly disposed may refer to it as selfishness, but the man who is being continually gouged by the system is very apt to refer to it as plain theft and robbery. There are laws to deal with the latter class, and it may soon keep some of the profiteers busy explaining why they should be left out of that category.

Politics No Cure Now

THE political parties at Ottawa are doing their best to try and line up again on old lines at Ottawa. They may deny it, but on both sides there are those who seek to bring to bear on the present situation nothing better than the old prejudices and heat of party affiliations.

They have nothing to offer except the return of one or other of the old-time parties to replace the fusion of forces which has taken place.

There are larger problems facing this country now than there were when the war was on. During the war there was a great dynamic force, driving the people together and ahead; there was the imperative element of win or die.

Now these things have been removed, and instead of the war problem of win or die, we have a tremendous economic and financial problem, with its sink or swim alternatives just as clearly marked as day and night.

The Governments of Canada have never yet been able to get right down to hard pan in the matter of administration. For that reason Government jobs have not attracted the best men. It seems to be the idea that it is a life appointment, and this country has always had scores of holders of little jobs that could be swept aside with no loss except to the little holder of the little job.

It is just a question if the people of Canada realize fully the problems with which they are face to face. There is too much political dust. The politician with his eyes glued on the ballot box and the next election is going to pay first and best heed to those things that are going to help get him elected. In the meantime the real big affairs of the country can go to the devil if they please.

If this country had problems during the war, it has more of them now. If they were big then they are infinitely larger to-day.

It looks as though the old political parties were getting ready to grab a war-sickened country by the neck, and shove a dose of old straight-line politics into its poor system.

In which case the country will continue to be sick and its people disgusted.

The Dangerous Car Driver

IT happened at the corner of one of the busy streets in Toronto a few days ago. He was driving his car at a fair rate of speed, and it looked as though he were an amateur at the job. At the corner as he turned to his left he was encountered by a heavy, and fortunately a slow-moving truck. By some strange turn of fortune he hee-hawed around this obstacle. At the curb there was a nice little runabout pulled up. The driver having missed the big truck, could not resist the driverless runabout. Nice driving and a cool head would have carried the day safely but not so with this plunger.

He sideswiped the runabout, caved in the door and running board, jammed the car generally and made his own bus look as though it had been used for trucking purposes on a sixteen-storey building, and by some mishap had fallen out of the window. This being over the car, engine still going strong and clutch in, made a head-on for the curb at the other side of the road. The hydro poles are strong things, and fortunately they are. They took the force of the smash, and by some wonderful process of brain work it occurred to the driver that the next best thing on his part would be to stop the car.

Had there been many people on the road some would have been struck. The driver had no more control of that car than he had of the high cost of living.

Now, the point is here. That driver was probably no worse than scores of others whom the law allows out on the streets in charge of cars. Had he nothing but a straight road, or simple corners, all would be well. But put him in a corner or a hole, and give him something where he has to think and act quickly, he becomes a mighty dangerous element on the road. He is liable to run into anything that is within radius of the engine-power of his car.

The rapidity with which motor traffic is increasing makes it necessary that something should be done to weed out the near-driver of the car. He may be a fine old chap and have no intention whatever of running down any person, or he may be the smart-aleck. The fact is that he can go ahead and take to the road with his chariot, knowing full well that were he to get into a tight place he would explode and drive wild enough for a three-ring circus.

There are rules, regulations and laws for everything under the sun, but there is nothing in sight yet that puts a halter on the fool driver and causes him to sit safely on the kitchen step while a qualified driver looks after the bus and the welfare of its occupants and the travelling public in general.

Speakin' of Profiteers

THE thing that's takin' lots of time and makin' lots of smoke, is the effort that's being made just now to corner certain folk who have been makin' dollars quick and grabbin' of the cash, while others strive to keep alive on sawdust, hay and hash.

They crooked a finger at some prune who ran a butcher shop; he had been gouging folks at home, he made them pay the shot.

He looked the judge right in the eye and waved his fist about, and opened up his sturdy jaw as though to hoot and shout. But then a tear stole to his eye, his voice was soft as lard, his heart was tender as a stew, his countenance not hard.

"Nay, nay," he said, "I am not he who profiteered, by heck, nor soaked the common horde for fair, nor camped upon their neck." Another tear chased down his face and crawled across his jaw, to think that folks suspected him of comin' 'gainst the law.

And then they brought a farmer, an honest son of toil, who gouged great holes into the folks, likewise into the soil. Oh, he had bought a joy cart new an' built a new bank barn, and likewise he had carved into the mortgage on his farm. But, bless my soul, he had not made no profits worth the name; his pickin's, so he said, were poor and most uncommon tame.

And so they had a whole procesh to try and find the chap who'd led the profiteerin' biz and staked it on the map. But, good land sakes, he was not there at mornin' nor at night, the chap who'd took the family purse and bled the hang thing white.

I long to see some hardy soul arise and make a bow, and in a voice that's noisy like, far more so than a cow—announce that he's a profiteer, a guzzler and a crab, who'd taken all the things in sight he had a chance to grab!

I would not hiss this chap, oh, no; nor would I heave a brick, nor take my heavy working shoe and aim at him a kick. Nor would I clamor for a chance to smite him on the jaw, nor ask that he be turned unto the 'steenth kind of law.

Far rather would I take my axe, my chisel and my hoe, and then unto some lofty place I'd grab my plans and go, and to this honest, kindly soul who owned up to the graft, I'd raise of granite and of gold a tall and glistening shaft. And on the thing I'd carve a verse, perhaps, in way uncouth, to tell the folks what's yet to come of him who spoke the truth.—ARK.



MARKET DEVELOPMENTS



Labor Trouble Seems To Be More Remote

Independent Mills Seem to Be Quite Emphatic in Claiming That They Will Not Be Tied Up—Dealers Must Have a More Thorough Knowledge of Making of Motor Cars

THE MARKETS AT A GLANCE

UNITED STATES markets should show a tendency to come down to a more settled condition shortly, greatly to the relief of the steel and machine tool industries. As far as the steel situation is concerned, the independents seem to be far more certain than the corporation that their plants will not be tied up. They have assured their agencies in this country that the chances for trouble are becoming more remote each week.

There are some concerns in Canada, especially those building boilers, that have a fine line of business just now. They are buying very heavily, and have orders that run well on into the future. In fact, in referring to one of these concerns a Toronto warehouse stated that, "We have sold more material to them in the last week than in any similar time since we have known them."

There have been no prices changed during the week. There seems to be a desire on the part of many in the trade to leave prices alone as far as possible. The claim is made that further increases simply tend to keep up and increase the agitation that is going on against the cost of materials.

United States points state that the exchange rate is hindering business there, especially anything that looks like export trade, as nations can purchase their needs to much better advantage in other markets where their money is worth more.

The scrap metal market is passing through a peculiar era, for which there seems no good reason, unless it be that there is some manipulation going on in the larger centres. There was a slight break in New York about ten days ago, and so far there has not been a corresponding recovery. Local dealers have not marked down their lists but they state that the figures they are quoting are only nominally correct and may change very suddenly.

MONTREAL REPORTS DEMAND YET FOR THE SECOND-HAND EQUIPMENT

Special to CANADIAN MACHINERY.

MONTREAL, Que., Sept. 4.—While the labor situation in the States appears less acute, there is, nevertheless, an atmosphere of doubt as to what the next few weeks will develop. This uncertainty is reflected in the market here and trading is consequently of a quiet nature. Business continues to drag along as in the last month or so. With little or no change in mill prices dealers continue to quote figures that have prevailed for some time. Early operations and prices will depend, very largely, on the developments of the next few weeks, in which period it is thought that some understanding will be arrived at between the producers and the workmen. Shippers have become interested in the announcement that more cargo space will be available on Atlantic vessels. This has been placed at 50 per cent., an increase of 10 per cent. over what it was expected the Ministry of Shipping would grant to Canadian shippers. The holiday season has had the effect of slowing up business, but sufficient is passing to maintain the interest of manufacturers and dealers. Steel trade has had a quiet week, but indications point to renewed activity early in September. Metals have fallen off a little as a result of the lighter demand. Machinery trading is easier, with second-hand trade becoming lighter. Scraps are moving slowly, but dealers are maintaining firm prices.

Metals Slightly Easier

No material change is reported in the metal situation, and apart from the slight easing of prices, the market is unvaried from that of the past couple of weeks. Demand is, if anything, a little lighter at present, but this condition is generally accepted as being in order at this time of the year. Coppers are down ½ cent, the price quoted being 26½ cents for lake, and 25½ for electro and castings. Tin is steady at 60 cents. Spelter, lead, and antimony are each marked down ¼ cent per lb., the quotations being 9¾ cents for spelter and antimony, and 7¼ cents for lead. Aluminum is quoted at 35 cents, a drop of one cent on the week.

Quiet Week in Machine Tools

There is considerable business being done in second-hand machine tools, but the volume of such sales is gradually assuming a position of less importance. A fair demand is present for new equipment, and this would show some increase if delivery was more certain. Some dealers here have stated that this factor has affected their sales materially. The past week has developed no features of interest and business generally has been below normal.

Scrap Movement Quiet

"The movement in scrap at the present time is of a very conservative character, as we are more or less in the dark as to early developments. The situation in the States, of late, has been a disturbing factor, and the market has consequently been quiet, but little weakness has developed from the lesser demand. Should conditions become more stable there is a possibility that strength will follow. In anticipation of early labor settlements we are holding firm on previous quotations." This statement by a dealer here reflects the general conditions, but coupled with this it should be remembered that August is invariably a quiet period, not only in old materials, but in other lines of industry.

STUDY INDUSTRY TO SELL EFFICIENTLY

Toronto Markets Show Signs of Strength And Business is Reported As Sound

TORONTO.—The holiday has taken, as usual, the keen edge off the business days, according to many of the dealers, who claim that it is almost the middle of the week before they get well under way again. Buying continues to be good in many lines, particularly where the raw materials of manufacture, such as plate, sheets, etc., are concerned.

The scrap metal market is passing through a rather peculiar era, and for no particular or well-defined reason. Those having anything like a large quantity of well-assorted material are simply holding firm and waiting until something more definite develops.

Study the Industry

The methods and ways of doing business are changing, and the machine tool field is no exception to this. The manager of one of the largest Toronto houses sized the situation up as follows this morning: "The Canadian machinery men must study the automobile business if they are going to get the best results from selling to the firms that are in the business and going into it. When a man wants to make cars, his proposition is that he wants and expects the machine tool salesman to get him a plant that he knows will give him the necessary production at the price he is figuring on. Now, in order to do this it is necessary to study and know the business of making cars and their parts. If a certain grinding job cannot be done in the standard equipment, then it may be necessary to specialize and get something that will give quantity production. The same thing can be said of many other operations that are now in many cases considered as being work for standard equipment, but which in reality could be done to better advantage by a special-purpose machine. And right here is where the dealers here often find themselves in trouble. They need a man from the various machine tool works, an engineer, or an expert, who can give expert advice on what his firm can do with these various operations. It is a hard matter for the Canadian dealer always to get this sort of service, but it is a question that must be met."

There are very few dealers in this section of the country that have not been down around the Border Cities during the last few months looking for business. There has been a good lot of selling, especially for the machine tool men with the concerns that are coming over from the United States. One complaint they have is that there is a tendency to do business still "across the line," direct, instead of letting the Canadian representatives of these firms handle their business.

Selling Is Still Brisk

"They bought more this week than in any week since we have known them." That is the way one large warehouse in this city sized up the amount of business that was being taken on by a well-known manufacturing concern. Warehouses in many instances are buying heavily for their own stocks, and find it difficult to keep up with their range. This is especially true with regard to plate, for which there has been a very good demand, and there seems to be no let-up.

Firms that are represented in Canada claim to have no fear of a tie-up of their steel mills. The independents seem to be more certain of this than the corporation mills. They—the independents—state that whatever trouble there has been was local, and adjustment has been made. Of course they realize that it is not well to go the length of making the statement that they will not have a strike, as things all over the world seem to preclude that degree of certainty in referring to any industry or calling.

There is still a desire to take on business in many lines that have been thought to be pretty well sold out and booked up. Concessions are made in queer ways rather than to make a departure from the adopted price schedule. And so it is that the exchange rate provide the latest opening for the concession business. A good many of the mills will now absorb the exchange rate up to three per cent. Some of them held out against this for a while, claiming the prices quoted would be on date of delivery with the exchange paid by the customer on this side of the line. But when one concern or group of them gets away from the beaten path it makes a very good talking point for the buyer who had not heretofore received any concession. Of course many of these little things soon gain circulation in the market, and the demand increases in proportion to the knowledge that concessions are to be had for the insisting. There is also one firm in the copper and brass business that is making this concession on the exchange, but for the most part it applies to plate and sheets, mostly the latter.

Uncertainty in Scrap Metals

There is no saying just at the moment what is likely to happen in the scrap metal market. One does not like to think that there may be a break and indeed there is no reason on the surface why there should be, but for all that there is a feeling of doubt that is putting the scrap metal business on the shelf for the present. The market weakened just about a week or ten days ago, without any warning and for apparently no good cause, apart from manipulation. The starting point of the weakness was in New York, and the situation in those larger centres quickly finds its double in Toronto and Montreal markets. Prices broke there, and there was an immediate tightening up of business. It is not that a half cent off makes such a terrific difference to the market, but it is that this little decline throws a fear into the trading that takes some time to overcome.

Toronto yards are not marking down prices, although they are not keen to do much buying at the values quoted on another page of this week's paper. Unless things show a tendency to come up stronger again the chances are that some of the prices now considered all right will suffer a reduction. For the present, therefore CANADIAN MACHINERY would state that the figures we quote cannot be guaranteed for any length of time. That they are, under the circumstances, nominally correct, is the real situation.

Metals Down a Little

Copper, electro and castings, are a shade off this week. Dealers in copper are not looking for a drop, claiming that if prices do go off it will only be temporary. There is still a very good demand for copper, and that alone is counted upon to keep the prices pretty well up to present levels.

POINTS IN WEEK'S MARKETING NOTES

There is still a considerable amount of uncertainty in the scrap metal markets, and buyers and sellers alike are holding back.

—

Pittsburgh reports that the chances of a strike in the steel trade seem to be growing less. The strike committee will have to call a strike if they wish to convince the steel mills that they are acting for their employees, which claim the steel mills repudiate.

—

In order to make concessions in regard to Canadian business some of the firms are now absorbing the exchange rate up to 3 per cent. At least one copper and brass concern is doing this, while the practice is quite common among the plate and sheet industry.

—

Toronto warehouses are putting some very fine specimens of standard machine tools into stock, the goods having been ordered as far back as three months ago. Deliveries are not improving.

—

Speaking of one well-known Canadian concern, a warehouse representative stated to CANADIAN MACHINERY this week: "They have bought more material in the last week than in any similar time in all the years we have known them."

—

Prices of steel and iron are firm, but there seems to be a growing feeling that there should be no advances announced, as it is in the interests of all concerned that there should be a falling off in the increased cost cry.

EXCHANGE RATES MAKE IT HARD FOR U.S. FIRMS TO DO EXPORT TRADE

Special to CANADIAN MACHINERY.

NEW YORK, Sept. 4.—Labor unrest is having its effect on the machine-tool markets. This has been somewhat marked in the past week, though the outlook is clearer now. The firm attitude of President Wilson on the demands of the railroad shopmen and his insistence that railroad workers on the Pacific Coast return to work have been reflected in a better sentiment. There is not so much fear of a strike in the steel industry now that Samuel Gompers, head of the American Federation of Labor, has had a conference with President Wilson on the subject. Many striking workmen at various plants have returned to work during the past few days, and from every point of view the labor situation looks less disturbing than a week or so ago. The reduction in the cost of living, which the Administration hopes to bring about, will, undoubtedly, have considerable effect in stabilizing industrial conditions.

Despite the lack of any very large buying, a very fair volume of machine-tool business is being done for this season of the year. Some machine-tool builders making machines largely used in the automobile industry are pretty well sold up for several weeks or months ahead. Deliveries on many lines are getting further off. The price situation is also stiffening. Practically nothing is now heard of any price concessions, but quite on the contrary there are more and more predictions that prices will be higher this fall. Some makers of milling machines have made an advance of about 10 per cent., effective at once.

If the exchange situation in European countries would improve, considerable export business would undoubtedly be done by American tool builders, but under present circumstances very little can be accomplished. Japan is the most active foreign buyer, being in a better position than any other large user of American tools to buy here without disadvantage.

There is a fair amount of buying of cranes, but there is keen competition and some slashing of prices on nearly every desirable job. During the war a number of new crane manufacturing companies came into existence, and these are now added to the old plants which were established many years before the war, with the result that there is scarcely enough business for all. It is declared that many crane orders have been taken lately at very close to cost price. The Toledo Bridge & Crane Co., Toledo, Ohio, has received an order from the Pennsylvania Railroad for several cranes for a repair shop at Stark, Ohio, and the Cleveland Crane & Engineering Co., Wickliffe, Ohio, has been awarded an order for about 8 or 10 cranes for the new tube mills of the Youngstown Sheet & Tube Co., Youngstown, Ohio. The Navy Department has awarded to Niles-Bement-Pond Co., New York, an order for five cranes for the Philadelphia Navy Yard.

IT IS NOW UP TO THE STRIKERS TO CARRY OUT THE THREAT TO STRIKE

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., Aug. 30.—Possible labor troubles in the steel industry have been even more the dominant factor in the iron and steel market in the past week. This does not mean by any means that at any time the balance of probability has been that there would be labor troubles. If there were only one chance in 10 or 20 of there being a strike or a voluntary closing of mills (and producers certainly would close their works themselves rather than leave it to the workers to do so) that would be the dominant factor, for the reason that in this dull season there are no other factors or influences of the least importance.

The labor situation, moreover, has had various important ramifications. Its most important is its influence upon prices. Nothing could more thoroughly stabilize prices on their present level than this. On the one hand, with the bare possibility of production being curtailed by labor troubles, no steel manufacturer would think of shading existing prices for the sake of securing an order, for the mills are already fairly well filled with business, and in some lines are crowded, while on the other hand the labor unrest that unquestionably exists, even though it is altogether improbable, there will be any disturbance, is such that any price advancing tendency in the market would be harmful in the extreme. It is the common opinion of nearly all manufacturers, and those who hold the opinion assert it is the opinion of all intelligent manufacturers, that no price advances, even of minor character, are permissible in present circumstances. Price advances would arouse labor to make demands, and would create public antagonism, for the public is now coming to realize that the high cost of living, against which there is so much outcry, is all one thing, made up of many parts, including all wages and prices of all commodities. An advance in any wage rates, or in any commodity, or in any transportation rate, is recognized as affecting the whole structure in which the cost of living is involved.

Thus iron and steel prices may be regarded positively as at a dead level. Recently a few sheet manufacturers started quoting higher prices for their product, but they were very anxious that their names should not get into the trade papers, let alone the daily papers, and now if they do not wish to sell they are much more likely to say simply that they are out of the market than they are to quote a price above the recognized market level.

In some pig iron districts furnaces have been attempting to spread the idea that pig iron prices are higher for next year than the level prevailing for some time past, for this year's deliveries. Assertions have been made that sales have been put through at advances of from 50c to $2 a ton. Generally speaking, such references are undoubtedly incorrect. In occasional instances a buyer of foundry iron may have had occasion to contract for next year in order to cover contracts for the sale of their finished products, but such transactions would be entirely exceptional. Never in the past has the pig iron market advanced that way. When higher prices come, they come first for early delivery, representing in substance a delivery premium, and then if the market is strong enough the higher price gradually extends to the later delivery.

The special committee of the general committee for organizing iron and steel workers, appointed to seek a conference with the iron and steel producers in regard to enforcing the 12 points in the labor platform enunciated July 20, and empowered, in case no conference could be secured, to call a strike, failed to get the conference and thus far has failed to call a strike.

Whether the iron and steel workers have an organization or not is debateable, the manufacturers asserting that the strike vote announced Aug. 20 as 98 per cent. affirmative, did not represent more than 15 per cent. at the outside of the workers. The men soliciting a conference, however, claim they are an organization. In this they have the advantage of the manufacturers, who have no organization, and thus the special committee had to approach Judge Gary, chairman of the Steel Corporation, as the leading man in the trade. When they went to his office Judge Gary sent out word politely declining a personal conference and suggesting that the committee put what it had to say in the form of "a written letter." In writing a letter the committee could not ask Judge Gary, as doubtless it wanted to, to invite all the iron and steel manufacturers to gather for a conference, as Judge Gary would undoubtedly have replied promptly that he was minding his own business and did not care to be the committee's representative in seeking a conference with other manufacturers. The committee, therefore, simply asked for a conference with Judge Gary and Judge Gary replied, refusing, and saying

the Steel Corporation stood for the open shop as against the closed shop and would not discuss business mattters with labor unions. Judge Gary referred to the many things the Steel Corporation had done for its employees, in welfare work of many kinds. The committee replied saying that if these claims as to good treatment were true "even in a minor degree" (and they are absolutely true) the committee would not be seeking a conference. A few days were left and Judge Gary was urged to grant a conference. As he denied that the committee represented the Steel Corporation's employes, they could only prove the point by calling the strike.

The committee then went to Washington, and President Gompers, of the American Federation of Labor, had a conference with President Wilson, who, several days before, had issued a very strong statement, calling for a truce as to all labor demands and during that every citizen co-operate to stop this whole thing. Apparently there was a forlorn hope that the President could be induced to use his influence with the steel manufacturers to get them into conference with the labor leaders, and, obviously, it failed. In bringing the issue before the President the committee burned one of its bridges behind it. It burned another when it wrote to Judge Gary that only a few days were left in which to avert a strike. It burned another, between it and the 12-plank platform enunciated July 20, when it wrote to Judge Gary, "There has not arisen anything between your corporation and your employees, whom we represent, in which the question of 'closed shop' has even been mooted." The fact is that one of those 12 planks was nothing less than a demand for the "check-off," which is the most extreme form of closed shop labor leaders have been able to conceive, and which they never succeeded in establishing, except in some of the union coal mines.

The prevailing view now is that labor demands have just passed their crest and that progress has now commenced towards saner counsels.

MOST FURNACES NOT ANXIOUS TO TAKE ON BUSINESS FOR THE COMING YEAR

The pig iron market still shows strength, with many makers booked up for the present year. 1920 business is not being booked very largely owing to lack of eagerness on the part of furnaces for this business. Basic orders have been placed. Following are reports from U.S. points:

Chicago.—While there is a good general demand, it is not as heavy as in recent weeks. This is chiefly due to labor uncertainty, and makers are not sure how long they can keep their plants running without a strike. The feature of this week's business was the selling of about 30,000 tons basic, in two lots of 10,000 each, and a number of small lots.

Boston.—There have been some sales for 1920 delivery, two orders aggregating 2,000 tons having been sold at $30 furnace for 2.25 to 2.75 silicon. There is no competition from Southern furnaces as far as New England is concerned. About 6,500 tons have been sold during the week.

New York.—There has been a fair volume of business made up of small lots, and generally for this year's delivery. There is but little 1920 business being booked. Export business is very slow, but one lot of 500 tons hematite was booked, and a few tons of foundry iron.

Philadelphia.—Business has been good generally in the pig iron market, bookings being made for both this year and next. 1.75 to 2.25 silicon was sold at $28.50 to $29.50 delivered Philadelphia, 2.25 to 2.75 silicon bringing $1 more for this year delivery, while next year delivery is quoted about $1 higher on all grades.

Buffalo.—There is not much furnace capacity unbooked for this year in this district, and there is not much eagerness on the part of makers to book for next year delivery. Enquiries for about 10,000 tons for first quarter foundry iron are out.

Pittsburgh. — The demand here is chiefly for foundry grade, and one sale of this grade sold for last quarter at 50c per ton over the market rate. Steel making grades are not being called for, but in spite of the limited demand prices in these classes are holding strong.

Cleveland.—Foundries which had completed their purchases for this year are in some cases finding it necessary to come into the market again, their consumption being above expectations. They are after small lots up to 1,000 tons. Furnaces are generally booked up to January 1, and are not looking for 1920 business.

Cincinnati.—Although there is considerable enquiry for next year delivery iron, no quotations have been made on any of these. Higher prices for next year seem to be a foregone conclusion.

St. Louis.—There are numerous enquiries for small tonnages covering both immediate and future shipments, and the market is firm though little actual business has been done.

Birmingham.—Production has increased and several more furnaces are scheduled to blow in during the coming week. At the same time sales have been good and mostly for prompt delivery. An increase of $2 is spoken of for next year delivery.

SOME WEAKNESS IN SCRAP METAL TRADE

With the exception of the New England district, there has been a general weakening of the scrap market. Following are reports from various United States points:

Pittsburgh.—Steel makers are getting more particular about the grade of material delivered to them, with the result that many rejections are being made. Dealers are showing their confidence in future high prices by laying down heavy melting steel at $20.50. No. 1 cupola cast is being bought by dealers at $24.

Boston.—Heavy melting steel has recovered from the decline of last week, and dealers are now being asked $16 for this grade. No. 1 machinery scrap is in good demand, and this grade and stove plate have also stiffened in price. Heavy cast iron scrap was sold at $21.50 delivered.

New York.—The situation in the scrap market is materially better, the trade feeling much less doubt on the score of labor troubles than they have for some time past. Heavy melting is $15.33 to $16 per gross ton New York. Cast scrap and wrought are active.

Philadelphia. — Small business was done in heavy melting during the week. Consumers tried to benefit by the weak market in Pittsburgh by offering $18 to $18.50 delivered for heavy melting steel, but dealers would not sell at this price. Foundry scrap is in good demand.

Buffalo.—Business has been practically at a standstill here, neither dealers nor consumers being willing to do business. All scrap is firm in price, with little selling.

Cleveland.—There have been slight declines in several grades, following a week of stagnation. Heavy melting is down to $20.25 to $20.50. Cast borings $15 to $15.50, and bundled sheets $15.50 to $15.75. Wrought scrap is unchanged.

Chicago.—Dealers are waiting for better prices, and consumers are willing to take the chance of waiting a while, so transactions are practically nil. There is little railroad scrap offering.

Cincinnati.—Business is dull, both dealers and consumers seeming willing to wait. There is not much change in prices, but the situation is weak.

Birmingham.—There are numerous enquiries, but very little activity. There is some inconvenience to the dealers through car shortage, but dealers generally are sitting back and awaiting for an improvement in the market.

OBITUARY

Theodore Cooper, well-known consulting engineer, died at his home in New York at the age of 81 years. Mr. Cooper was identified with the first elevated railroad in New York, and was consulting engineer for the Quebec bridge and the New York Public Library. It was said that had a telegram been received that was sent by Mr. Cooper prior to the collapse of the Quebec bridge in 1907, that accident could have been prevented.

FOREIGN STEEL MAKING LARGE INROADS IN THE BRITISH MARKET

Special to CANADIAN MACHINERY.

SHEFFIELD, ENGLAND.—A most unsatisfactory situation exists at the present time in the iron and steel trades in England because of the recent advance in coal prices and unrest in the coal trade. A sensation was created throughout the country when the Government recently announced an advance of 6s. in the price of coal. This was followed by a serious strike in the South Yorkshire coal field with the result that several steel plants were closed down, while at others output was seriously curtailed. The strike has been settled but unrest still exists.

Owing principally to higher wages, the cost of producing steel has been mounting for some time, and the recent advance in coal has, of course, caused another jump in iron and steel prices. It would almost appear that a climax has been reached, for at present prices the positions of English steel makers is threatened even in the home market, to say nothng of the foreign trade. The situation is interesting to the trade in Canada and the United States for the reason that American mills have been underselling British steel makers in the home market, which incidentally, is causing considerable alarm in England. Some steel men are frankly pessimistic and fear not only competition from the United States in the home markets, but also a serious cut into their export business.

An Acute Position

For some months American material has been coming here, and is causing considerable uneasiness. The unfavorable position of British manufacturers, owing to the fact that America is quoting considerably lower prices is now made more disheartening by the increase in the price of coal. The question of foreign competition will become more acute with the upward tendency in prices as the limit does not appear to have been reached as yet.

There appears to be an opening for Canadian manufacturers in the British mrket under prevailing conditions, for only quite recently a cargo of Canadian steel arrived at Newport, Mon., the price, plus freight, being lower than the home rate. Cheap labor is now a thing of the past in Great Britain, and with it has gone the chief cause for this country's trade supremacy. It remains to be seen if the increase in wages in other countries will affect the situation in England's favor or not.

The export of high-speed tool steels has materially fallen off, and this branch of the steel industry is quiet. There is only a moderate demand for railway steel, but makers of material used in shipbuilding yards and for automobile construction are very busy.

Cutlery are some of the other light steel branches that are very active, and more business is offering on home and foreign accounts than can be accepted. Generally speaking, a large amount of material is required for various purposes, but consumers are holding back with their orders on account of the unsettled conditions prevailing. To use a slang expression, they are waiting to see which way the cat is going to jump. It is generally believed that consumers will be driven more and more into the hands of American manufacturers for supplies, not only for bar iron for rolling and finishing, but for finished products. Even now American bolts and nuts are being imported, a new phase of competition within the last few weeks.

Production Too Low

Little, if any improvement is looked for in the general situation for some considerable time. In the coal trade, as in the iron and steel trade, wages are very much higher than before the war. The rate of production is still far from satisfactory and is generally reported to be anything from 30 to 50 per cent. below the pre-war standard. It is this feature of the situation that is causing so much uneasiness, while in addition, the high prices will retard expansion of trade for both domestic and export account

SECOND-HAND TOOLS BRINGING BIG PRICES IN THE OLD COUNTRY

Special to CANADIAN MACHINERY.

SHEFFIELD, ENGLAND, AUG. 15.—The British Government is selling the equipment at the various National Projectile factories. As might be anticipated some equipment such as shell forging presses, is not in demand, but electric motors and machine tools are selling well, in many cases considerably higher than the original cost.

At a sale recently at a National Projectile factory in Sheffield, 3-phase induction motors sold for £115 and £132 against their cost price of £104 each. A bolt screwing machine, which originally cost £61 15s., realized £100. A number of all geared 16-inch swing, self-acting, sliding, surfacing and screw cutting lathes realized £50 to £60 each. One bolt screwing machine sold for £100 and cost £16 15s. An 18-inch swing all geared head lathe on an 8-foot bed sold for £85; 14-inch stroke double geared self acting slotting machine £305, original cost £245; a 22-inch fixed head drilling machine £60, cost $45 15s.; a planing machine to plane 6-ft. x 3 ft., £380, cost £252; three 9-inch centre double gear screw cutting lathes realized £150, £100 and £50 respectively, and a 7½-inch lathe was bought for £30; a 2 foot 6 inch "Forsdick" radial drilling machine found a buyer at £230, the original cost being £200. A 16-inch stroke swivel head self acting shaping machine was purchased for £145, whilst a number of vertical pneumatic hoists realized from £5 10s. to £8 10s. each.

Prices of new machine tools are holding very firm, but there is little demand. Consumers are now buying much equipment now owing to the unsettled conditions.

AUSTRALIAN TRADE FOR THOSE WHO STUDY FIELD AND GO AFTER BUSINESS

IF the Canadian manufacturers in any and all lines want to secure more of the trade of Australia they will have to make up their minds to look after it more thoroughly than they have ever done before.

That was the opinion of a Canadian business man, who just returned from that country, but who, for various reasons, does not wish to have his name used. "There are developments going on in the steel and iron business there, particularly at the hand of the Broken Hill Company at Newcastle, N.S.W. This company has had a romantic career, and is a wealthy concern. During the war they were careful of their prices. They did not indulge in profiteering, and the chances are that in consequence there may be some favorable tariff arrangements made to assist their future development. In the war period, for instance, you could purchase rails in Australia from that company for less than the freight on them would have been from United States or any other country that was in a position to sell them. Of course, there is a market there for steel. Although the Broken Hill people are making good progress they cannot begin to supply the market. Sheets and bars are the lines most in call just now from what I could observe, although I was not there in the interests of the steel industry.

Must Act Quickly

"There is one thing the Canadian business world should think of," our informant continued, "and that is that there are more mails per day between Hamilton and Toronto than there are between either of these places and Australia. For that reason the people in this country should be very prompt in answering any letters they may happen to receive from Australia. I heard of several cases where this had not been done. In fact, in one instance, I was told of an Australian firm sending letters to several places in Canada and United States asking for certain information about lines in which they were interested. Evidently the United States

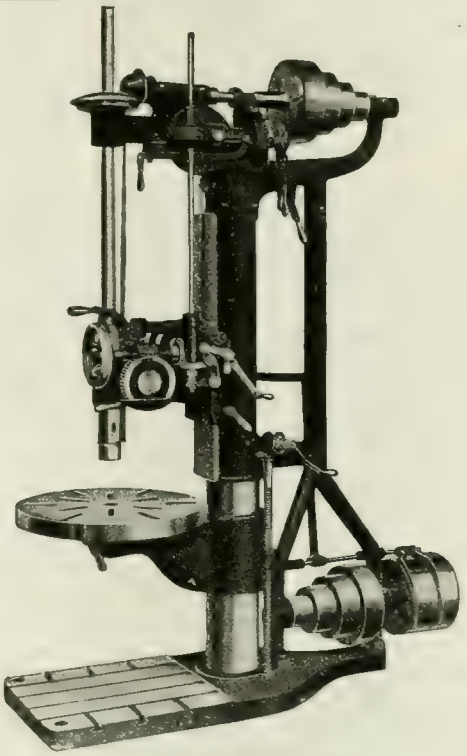
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Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

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firms had answered immediately upon receipt of the letters, while in the case of the Canadian houses they were away behind, and the business had really been placed before they were heard from.

The Selling Policy

"It is not an easy matter for a new line to be placed on the market in Australia. For instance, I remember seeing one very large machinery house in Melbourne, the name of which I cannot recall for the moment. It had a tremendous floor space and splendid warehouse windows for displaying the goods. I made some enquiries about the manner in which such a business was carried on, thinking that it must take a very large amount of money to stock such a place, but I soon found that much of the material there was consignment goods. Of course, that is not done to such an extent now as before the war. But I was given to understand that at that time business was carried on largely in that way. The firm would order a couple of machines from some well-known English company with whom they had good connections. The two ordered would be sent along, and the English firm at the same time would send along an extra two on the chance of their being disposed of. There are large stocks of machine tools and supplies, such as drills, etc., carried in the same way."

According to the gentleman to whom CANADIAN MACHINERY was speaking, there is a very favorable feeling toward Canadian trade in Australia. He seemed to think that there was also a desire to protect the home-made article wherever it showed a tendency to develop. This representative had been there in the interests of a Canadian firm, and was satisfied with the results of the trip. He seemed sure that the best way to get foreign business was to go after it, study the market thoroughly, find out in what ways the goods wanted differed from those being turned out for home consumption, and then set out to supply them. He instanced the way in which certain of the large agricultural implement firms had set out to supply the Australian trade, and how they had succeeded by making the implements to suit the needs of the various soils and practices of the Australian farmer. The Australian, he concluded, were good buyers now, but they were not buying with their eyes shut.

MONTREAL NOTES

The John McDougall Caledonia Iron Works, of Montreal, are now completely closed pending the further action of the liquidators. The entire plant and property is now for sale.

The grey iron foundry, now under construction for the Thos. Davidson Co. of Montreal, is nearing completion. The walls and roof are about finished and in a few weeks it is anticipated that the equipment will be installed and ready for active operations.

Edward A. Robinson Co., Ltd., of 228 Craig Street W., Montreal, railroad and engineers' supplies, expect to open an office in Toronto in the very near future, with H. H. Davis in charge. L. O. Larkin has been engaged to assist Mr. Robinson in the Montreal office.

The Dominion Bridge Co., of Montreal, have just completed the first of two 2,100 h.p. steam turbo-blowers for the Sudbury plant of the British-American Nickel Co. For the past week this unit has been undergoing tests at the plant of the Bridge Company.

Thos. Moore & Son, 224 Lemoine St., Montreal, have secured the exclusive Canadian agency for McKechnie Bros., Ltd., Metal Works, Rotton Park Street, Birmingham, England, manufacturers of extruded brass rods and sections, hot brass and bronze stampings and pressings, non-ferrous ingot metals, and every description of brass and bronze drop forgings.

Robt. McCleery, formerly works manager of the John McDougall Caledonia Iron Works, is now associated with R. W. D'Arcy in the D'Arcy Engineering Co., efficiency engineers and machinists. They have leased a property at 34 St. Ferdinand Street, Montreal, and are now installing the necessary equipment for immediate operations. The temporary offices are at 95 Laporte Ave., Montreal.

Extensive alterations are being carried out on Commissioners Street, adjoining the Montreal Harbor, in the way of tearing up the pavement and making preparations for the relaying of the tramways tracks, which has been necessitated by the added requirements of the Montreal Harbor Commissioners, who are taking over a considerable strip of Commissioners Street for increased railway accommodation.

Press announcements have just been received that the Ministry of Shipping has reduced their requirements for space on cargo vessels. It was their intention to retain 60 per cent. of the cargo space, but this has been changed to 50 per cent. This will increase the shipping facilities for the Canadian exporters and help greatly in improving conditions, which have apparently been none too favorable during the past few months. It is further announced that there is a good possibility that the control of shipping may be discontinued within the next six or eight months.

REVIEWED YEAR'S BUSINESS AS CARRIED ON AT ALGOMA PLANT

Lower net earnings, but in several respects an improved general position, particularly in regard to the steel industry, are shown in the annual report of the Lake Superior Corporation, issued on Saturday. Net earnings for the year ending June 30 last, from operations of subsidiary companies, excluding the Algoma Central & Hudson Bay Railway, were $5,441,574, compared with $6,551,495 the previous year. The balance brought forward from 1918 was $668,292, but this year the balance carried forward by all companies was $1,589,388. The Algoma Steel Corporation, chief of the subsidiaries, with large works at Sault Ste. Marie, had net operations of $5,035,032, compared with $6,001,891 the previous year. The Steel Corporation, however, in addition to paying a dividend of 7 per cent. on preference stock for the year ended June 30, 1915, amounting to $700,000, paid the sum of $350,000 on account of preference dividend for the year ended June 30, 1916. At the same time, it carried forward a balance of $1,433,875, compared with $764,038 the previous year. Steel Corporation's financial position has been improved, as current assets stand at $13,834,842, compared with $11,147,259 the previous year, while current liabilities are but $2,449,790, compared with $3,059,826 in 1918. Total assets of the Steel Corporation show little change at $55,280,830.

Year's Steel Production

Production by the Algoma Steel Corporation as compared with the preceding year was as follows, in tons:

	1917-1918	1918-1919
Coal imported	595,064	880,591
Ore imported	781,082	709,510
Limestone produced	321,485	296,812
Coke	379,040	406,398
Pig iron	314,188	336,657
Steel ingots	399,712	414,932
Steel products	329,938	322,011

Enlargements to Plant

President Wilfred H. Cunningham, in reviewing conditions, says that the change from war to peace conditions naturally resulted in a stoppage of the manufacture of shell steel and steel for munitions purposes generally. "Toward the end of the year," he says, "the mills resumed the rolling of normal products in the shape of steel rails, rail fastenings, merchant bars, shapes, etc. Up to the time of making this report, business has not been plentiful, and for the last few months the mills have been operating at about half capacity.". Mr. Cunningham believes that repairs and replacement orders for steel must soon absorb considerable quantities. The long-cherished idea of a structural mill, he says, should now be dealt with, and plans are in preparation for a new universal mill consisting of a 40-inch blooming mill, 36-inch rougher, and three-stand 28-inch combination structural and rail finishing mills. These works, the directors believe, would have sufficient business, and they are vital to the continued success of the Steel Company. A scheme for financing the undertaking will be submitted to stockholders at an early date. In the meantime, the rail mill is being extended to care for such structural steel up to 15-inch beams and panels as may be required by the market.

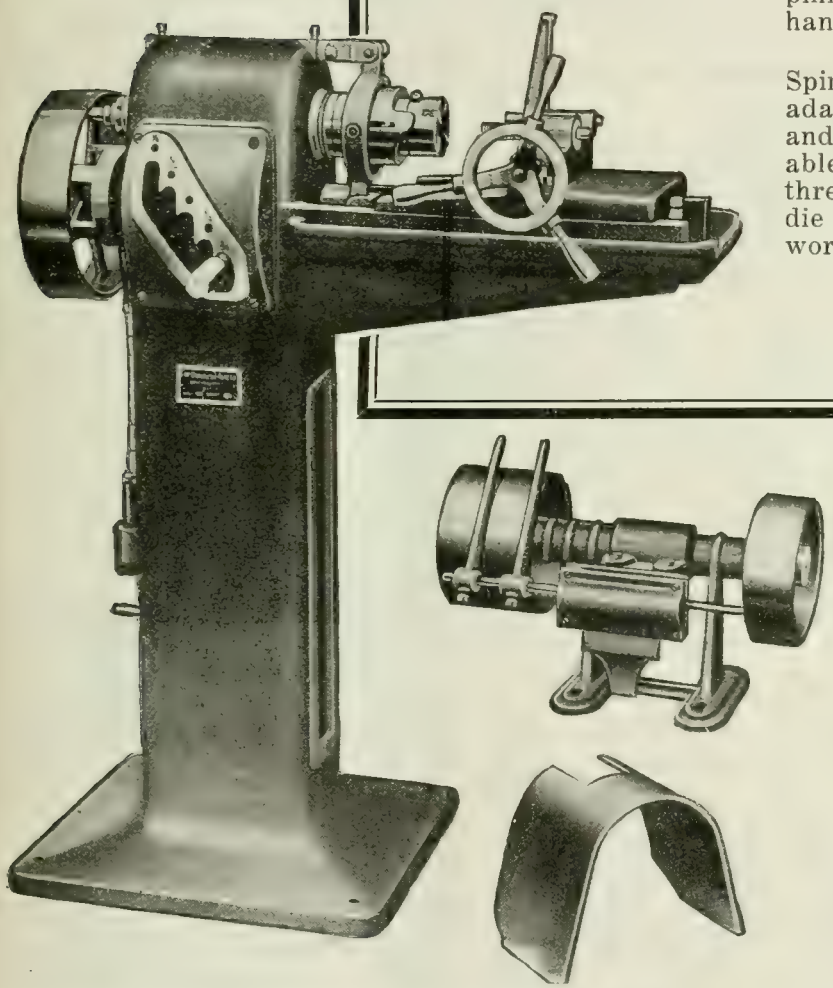
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Geometric Threading Machines are employed on a large class of small threaded parts that cannot be produced economically on the ordinary screw machine.

Made in three sizes—to cut ⅛ to ½ inch, ¼ to ¾ inch, and ¾ to 1½ inch diameter threads. The carriage is mounted on slides and on the largest size machine is moved back and forth by rack and pinion, and in the smaller sizes by hand.

Spindle speed changes readily made, adapting the machine to the diameter and material of the work. An adjustable stop assures accurate length of thread, and automatically opens the die head, permitting of drawing the work straight back.



A line from you brings full details regarding this machine. Tell us your threading requirements—let us recommend the proper Geometric Collapsing Tap or Self-opening die.

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SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bars, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 Pounds. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

	Gross.	
Lake copper	$26 50	$26 25
Electro copper	25 50	26 00
Castings, copper	25 50	25 00
Tin	60 00	58 00
Spelter	9 75	10 00
Lead	7 25	7 00
Antimony	9 75	10 50
Aluminum	35 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

WROUGHT PIPES

Standard Buttweld

⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces

WROUGHT NIPPLES

4" and under, 60%.
4½" and larger 50%.
4" and under, running thread, 30%.
Standard couplings, 4" and under, 40%, 4½" and larger, 20%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds. Montreal	Toronto
Copper, light	$16 00	$13 75
Copper, crucible	19 00	18 00
Copper, heavy	19 00	13 00
Copper wire	19 00	18 00
No. 1 machine composition	17 00	16 75
New brass cuttings	13 00	10 75
Red brass cuttings	15 00	14 75
Yellow brass turnings	10 00	9 00
Light brass	8 00	7 00
Medium brass	9 00	7 75
Scrap zinc	6 00	6 00
Heavy lead	5 00	5 25
Tea lead	3 75	3 50
Aluminum	18 00	18 00
	Per Ton.	Net
Heavy melting steel	13 50	13 50
Shell turnings	7 00	6 00
Boiler plate	13 50	11 00
Axles (wrought iron)	20 00	20 00
Rails	14 50	13 50
Malleable scrap	15 00	17 00
No. 1 machine cast iron	20 00	18 00
Pipe, wrought	8 00	5 00
Car wheels	20 00	20 00
Steel axles	20 00	20 00
Mach. shop turnings	6 00	6 00
Stove plate	14 00	13 00
Cast boring	7 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅝" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ⅝" and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent.
Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and Semi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	net
Collar screws	list plus 20, 30
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1½ in.	add $1 00
Cold pressed nuts over 1½ in.	add 2 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

Aikenhead's WALSTROM ATTACHMENT

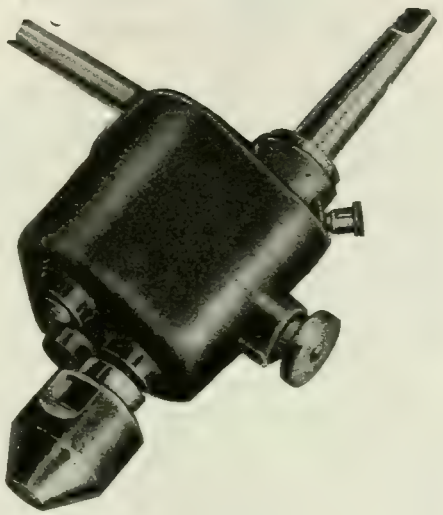
A Tap that will Revolutionize Your Tapping Cost

Taps holes as squarely as they can be drilled, ten times faster than is possible by hand, and **cuts tap breakage to a minimum.**

Its mechanically obtained **OSCILLATING MOVEMENT** closely resembles the action in hand tapping.

Easily attached to any drill press. Takes taps of all sizes up to 1 1-2 inch.

It will pay you to try it. We guarantee satisfaction.





Taps 10 Times Faster

Aikenhead Hardware Co., Limited

17 Temperance Street, Toronto

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 50
Linseed oil, raw, single bbls.	2 90
Linseed oil, boiled, single bbls.	2 92
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sizes up to 52	40
S.S. drills, wire sizes, No. 53 to 80	50
Standard drills, all sizes	50
3-fluted drills, plus	10
Jobbers' and letter sizes	50
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	net
Drills and countersinks	list plus 10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus 10 to	40
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill list plus 5%
At warehouse list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	7 10
Can. plates, all bright.	8 50	8 00
Apollo brand, 10¾ oz. galvanized		
Queen's Head, 28 B.W.G.		
Fleur-de-Lis, 28 B.W.G.		
Gorbal's Best, No. 28		
Colborne Crown, No. 28.		
Premier, No. 28 U.S.		7 50
Premier, 10¾ oz.		7 80
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

(Warehouse Price)

B

¼ in., $13.50; 5-16, $11.50; ⅜ in., $10.50; 7-16 in., $9.30; ½ in., $10.15; $13.00; ⅞ in., $9.60; ¾ in., $9.70; ⅝ in., $9.95; 1 in., $9.50; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $16.75; 3-16 in., $15.40; ¼ in., $14.20; 5-16 in., $11.50; ⅜ in., $10.50; 7-16 in., $9.30; ½ in., $10.50; ⅝ in., $10.00; ¾ in., $9.70.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.		45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod	0 34
Brass sheets, 24 gauge and heavier, base	$0 42
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11
Dark colored	09
Mixed colored	10

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS

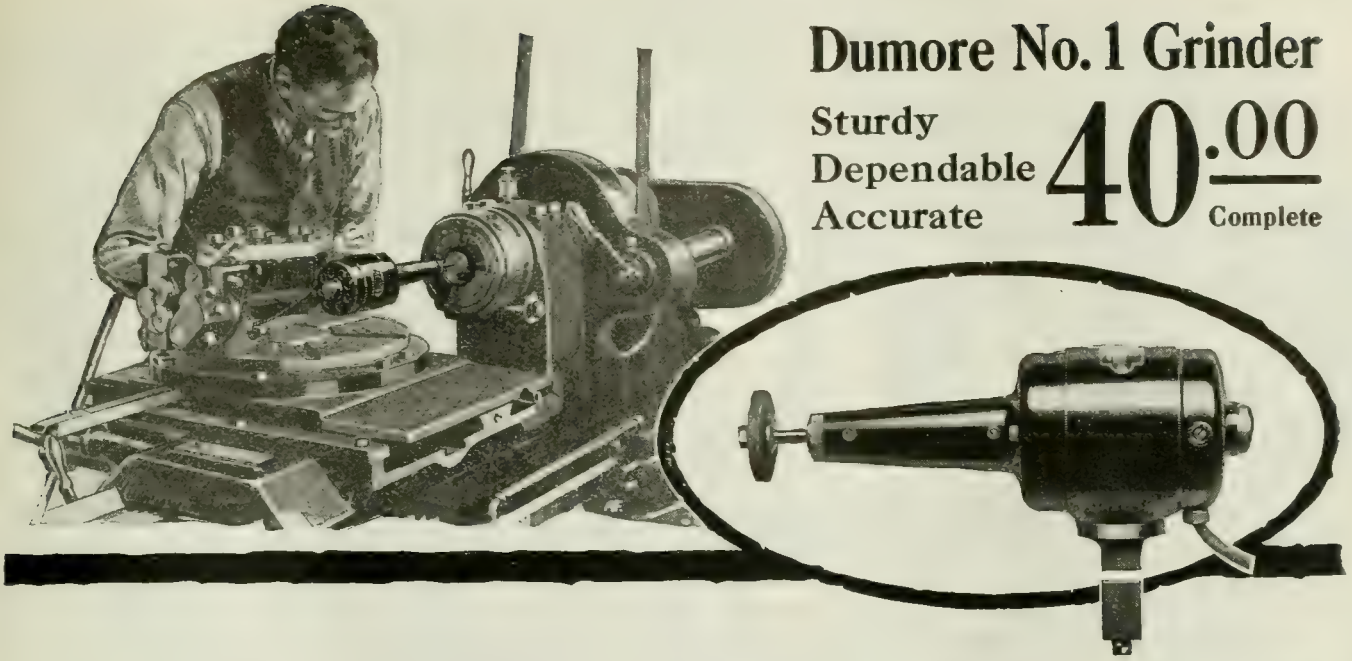
	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$.25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.15
Ammonium, carbonate	..
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.25
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	.75
Potassium sulphide (substitute)	2.25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	.80
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated



Dumore No. 1 Grinder

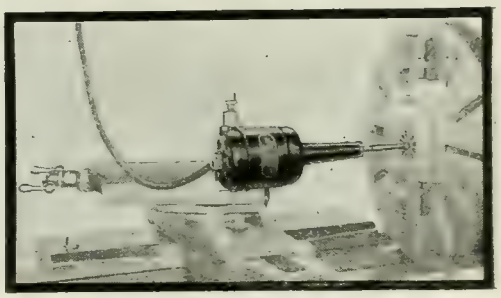
Sturdy
Dependable
Accurate

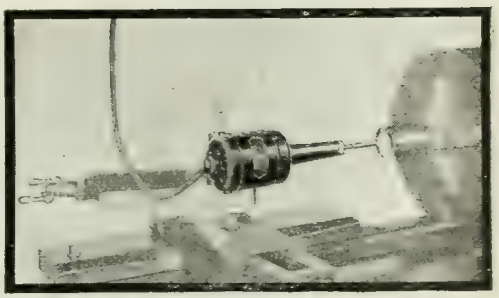
40.00 Complete

THERE is no doubt of the value of the **Dumore No. 1 Grinder.** No other tool, at or anywhere near its price, can give a greater amount of actual, accurate daily service.

Because jigs, dies, gages, bushings, etc., will always warp during tempering, thousands of mechanics use the **Dumore** grinder to bring these tools to as close limits as .0001". Such a degree of accuracy is possible solely because the **Dumore** is perfectly balanced throughout and operates at the correct cutting speed.

We have some very interesting literature for men facing grinding problems —write for it.







WISCONSIN ELECTRIC COMPANY
291 SIXTEENTH STREET
RACINE, WIS.

DUMORE HIGH SPEED GRINDERS

DEVELOPMENT OF THE STEEL PLANTS IN AUSTRALIA IN RECENT YEARS

An issue of the Trade & Commerce Bulletin some months back contained the following reference to the steel business in Australia, which may be interesting at this time:

The president of the Engineering Association of New South Wales reviewed the principal engineering developments at the annual meeting of the association held recently and stated: That quietly, but surely, a powerful steel industry was growing up in Australia. Not only was it expected that the Lithgow (100 miles from Sydney) and Newcastle (60 miles from Sydney) steel works would henceforth provide the whole of Australia's requirements of steel rails, but the time was not far distant when export might be possible. Of yellow and white metal alloys, it was interesting to note the development along sound lines of the manufacture of rolled manganese, phosphor, and other bars, and that difficult business had not been undertaken without due recognition of the necessity for maintaining a laboratory for the scientific control of the processes. Considerable improvement was taking place everywhere in the extension and addition of modern foundry equipment, the capacity of which for large iron castings was now practically unlimited. For the more difficult work of steel casting there was also a most noticeable improvement and an increasing number of plants are being laid down. The casting of steel rolling stock wheels is gradually developing to a satisfactory stage and it was generally understood that the establishment of another modern plant on extensive lines was contemplated in the near future at Newcastle. When it is remembered that there are now approximately 20,000 miles of railway in operation in Australia, it would be realized what possibilities there were for the local manufacture of rolling stock material.

A better example of high class workmanship could not be quoted than the manufacture of modern high speed steam engines which are now being successively made. In the manufacture and export of agricultural machinery, harvesters particularly, quite a striking success has been achieved, and a considerable quantity exported to Argentine and elsewhere. The imperative call of the man on the land for a cheap and handy form of power to supplant hand or horse power has given manufacturers of internal combustion engines a great impetus. Before the war perhaps 10 per cent. of the supply only was made locally and 90 per cent. was imported. In ten years' time the percentage will probably be reversed. Oil engines, from one-half horse power of the farm unit type up to semi-diesel marine engines of 150 horsepower are now being made. Ten years ago only 15 per cent. of the centrifugal pumps used were made locally. This figure is now believed to be 50 per cent. Refrigerating plant has for many years been made, but is worth noting that the largest compression so far made here was recently completed by a local firm. In machine tools, woodworking machinery, rail and road tractors and cars, tinmaking machinery, electric motors, capstans, boilers of every class, including water tube, further reminders are given that engineers are broadening their resources. Steam boilers which before the war could be manufactured and sold for approximately £32 to £40 per ton complete, are now costing £70 to £100 per ton, due almost wholly to the fact that boiler plates are only procurable at from £50 to £80 per ton. If a modern steel plate rolling mill had been established locally it could be producing and selling them under present conditions at £14 per ton.

Mr. G. D. Delprat, general manager of the Broken Hill Co., recently came to America on a special mission, thought to be in connection with purchasing additional plant. The manager of the steel works at Newcastle, N.S.W., is Mr. Baker, formerly manager at Sydney, C.B., of the Dominion Steel Corporation.

Coaling vessels, both with bunker and cargo coal, is carried out in the Far East entirely by hand labor. A series of stages are rigged on the vessel's side from the lighter to the bulwarks. From the bulwarks to the hatch a chain of men, women and children are stationed and on the stages the chain is continued. Many of the women carry their infants strapped on their backs. The coal is passed from hand to hand in tiny baskets, and the coal goes down the hatch in an unbroken stream. With four hatches working, a five thousand ton vessel can be loaded in about twenty working hours.

Navigation through the Suez Canal is carried on at night time by means of powerful search lights. The regular liners carry their own, but the tramps are provided with a portable outfit by the Suex Canal authorities. A cage is slung over the boat containing the light and its operator, who directs the light on to the narrow channel ahead. Current is provided by a small high-speed generator, direct-connected to a Brotherhood high-speed engine, the whole outfit weighing only a few hundred pounds. It is placed on deck and a connection made from one of the forward steam winch pipes to supply the steam. The apparatus can be installed and dismounted in about thirty minutes, so no time is lost.

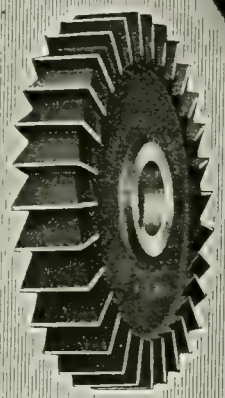


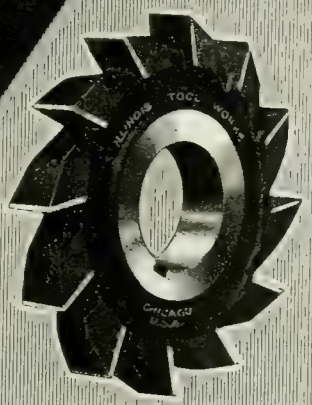
None Better *can be Made*

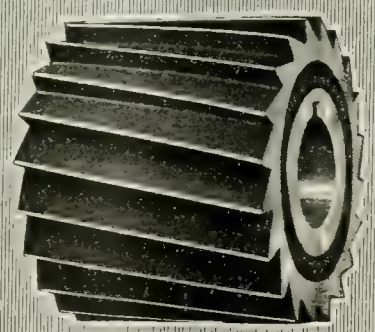
ILLINOIS

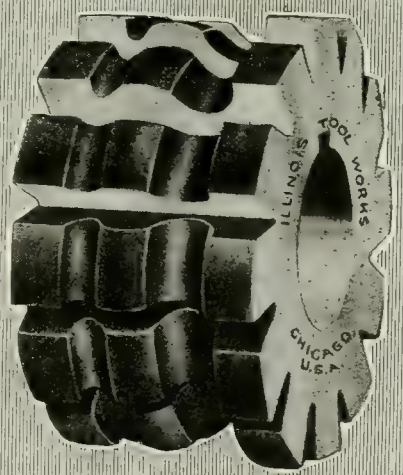
CUTTERS

No matter how difficult your cutter requirments may be, it is probable that we have solved similar milling problems for others.









ILLINOIS TOOL WORKS, CHICAGO.

Detroit Store—
Woodward and Warren Aves.

A. C. Towne, Inc.
17 W. Swan St., Buffalo.

S. J. Pfaff
Pioneer Bldg., St. Paul

Rose Tool and Supply Co.
111 Market St., Pittsburgh

Louis G. Henes
75 Fremont St., San Francisco

Title Insurance Building
Los Angeles

Indianapolis Office
616 Fletcher Sav. & Trust Bldg.

New York Office
141-145 West 36th St.

NEW IRON AND STEEL COMPANY

A charter for $8,000,000 was issued on August 13, to the Consolidated Iron and Steel Corporation Ltd., a company of Detroit and Toronto parties engaged in the mining business. The company is essentially Canadian, with head offices at 20 King Street East, Toronto. They own two large deposits of proven iron ore lands and it is their intention to proceed in a large way with their development.

The company has opened a large [illegible] mine on the C.N.R. in the county of Leeds, 25 miles north of Brockville at Furnace Falls, where they have 1,500 acres. The early settlers erected a smelter at this place 110 years ago and it was operated in a primitive way the ore being ground out by water wheel. It still retains the name given to the place at that time. This was in the days when Lake Superior and Pennsylvania ores were almost unknown. The city of Brockville has offered inducements to the company to build a pig iron smelter there, and it is being seriously considered as there is a surplus of electric energy at a low rate. As the mine has excellent transportation facilities, ore can be shipped by the St. Lawrence either west to Canadian and United States markets or east to Montreal, Ottawa and European markets.

Their other property, consisting of 2,500 acres, is located at mileage 182 on the Algoma Central Railway. This has been gradually developed since it was discovered in May, 1911. Up to the present time permanent camps have been built and diamond drilling has been carried on from November 1917, to July, 1918, proving up large deposits of ore to a depth of 500 feet. Prominent iron ore engineers reporting on this property estimate the tonnage at from $50,000,000 to one billion tons of ore. The ore is free from titanium and low in phosphorus and sulphur. Work on both properties is now being carried on, thousands of tons already being piled up at the Furnace Falls mine ready for shipment.

It is anticipated that German railway systems will find great difficulty in rebuilding their lines to pre-war standards, and that cheaper construction will have to be used, both on account of scarcity of raw materials and also financial difficulties.

* * *

Stockroom workers are often required to transform decimals to inches and inches to decimals. In the ordinary stock-room this is done by referring to a book or dirty chart, in most cases practically illegible.

In cases where a room is none too light which is unfortunately the general condition in stock rooms, an electric light is placed behind the board. The [illegible] figures are illuminated and [illegible] to the stockkeeper wherever in the room he happens to be.

Do You Know That

Antimony is said to have been discovered by Basil Valentine, a monk of Germany, in the fifteenth century. It is said that the word itself is derived from the Arabic.

* * *

The county of Cornwall, Wales, has yielded tin for at least 3,000 years, and the mines of Cornwall have been worked for the oxide of tin since the time of the Phoenicians and Greeks.

* * *

Lead was found before the time of Moses and was known to the Israelites and Hebrews. It was anciently used to purify silver.

* * *

Copper was the first metal known to man. The metal in the form of bricks and rings was used as a medium of trade by the Egyptians and Babylonians. It derived its name from the fact that the Greeks and Romans obtained it from the Island of Cyprus.

* * *

The addition of a small amount of bismuth to babbitt increases the antifrictional properties of the alloy. One-tenth of one per cent. has been added to No. 1 babbitt and the resulting alloy has always been of a fine, close, even grain, with remarkable wearing qualities.

* * *

Much has been written about new and marvellous methods of ship salvage. While apparatus naturally has been improved, the methods remain fundamentally the same. These consist of raising by lighters, in which method the reserve buoyancy of a number of lighters is utilized to raise the wreck from the bottom, the rise of the tide furnishing the lifting power; patching the holes in the hull under water, and pumping out, or building a copper dam on the superstructure to create a reserve buoyancy, and expelling the water by compressed air. For floating grounded vessels it is usually necessary to await a high tide, when there will be a greater depth of water than at the time of stranding.

* * *

An item in an American newspaper speaks about the trouble marine insurance men are having through pilfering of cargoes in Continental ports and mentions Genoa specifically. Genoa has always held an inenviable notoriety through the audacity and cunning of the water-front thieves. On one occasion a steamer undergoing repairs had occasion to send a large bronze valve, about 450 pounds in weight, to the shop on shore. A motor truck with this firm's name on it drove down, three men alighted and took the valve away. That was the last seen of it, and it transpired later that the truck had been taken from the front of the shop while its driver was inside. The truck was later found standing 100 yards from where it was stolen.

A writer in "Aeronautics" has an interesting suggestion to make about the landing of aeroplanes. He points out that this is where the greatest difficulty is experienced owing to the great space required to effect a safe descent. His idea is the building of wind tunnels, in which the aeroplane would meet a current of air driven at the same speed as the machine itself, but in an opposite direction. This would make the movement of the machine over the ground nil, and it could then be secured while the air current and the propellor were both gradually brought to rest.

* * *

The Dominion of Canada, since the beginning of the war, borrowed from the Canadian people no less than $1,436,000,000. This amounts to $192 per capita of population.

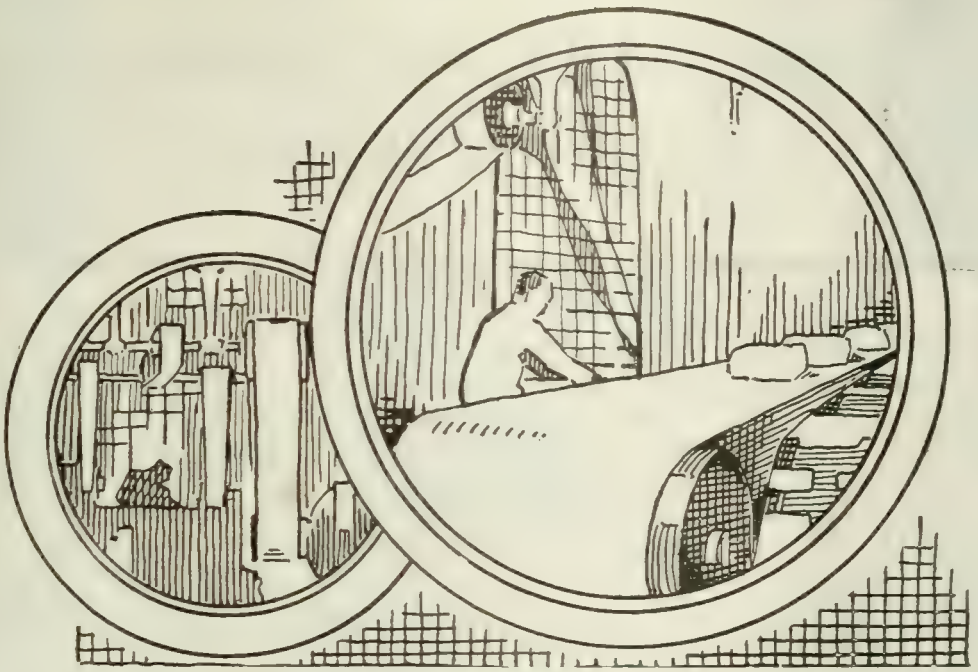
* * *

Tracings may be very readily cleaned and pencil marks removed by the use of benzine, applied with a cotton swab. It may be rubbed freely over the surface without fear of injury to the lines drawn in ink, or even water colors, but pencil marks and dirt will quickly disappear. The benzine evaporates almost immediately, leaving the tracing unharmed. The surface, however, will be somewhat softened, and should be rubbed down with a little powdered talc or chalk before drawing more ink lines.

BOOK REVIEW

Analysis of Babbitt by James Brakes, The Allen Book and Printing Co., Troy, N.Y.

It has been the desire of the author, as stated in his preface, to place before the mining, civil, electrical and mechanical engineer and others who have taken chemical analytical training, a small practical book on the analysis and manufacture of babbitt. The methods have been selected from the many methods in use for their simplicity, neatness and accuracy. At the same time reactions and data have been inserted which will prove interesting to the student in analytical chemistry. One of the most valuable features of the work is an extensive bibliography on books dealing with metallurgical engineering. The various metals met with in the manufacture of babbitt metal and similar alloys are each given a chapter to themselves and their properties, their qualitative, quantitative, volumetric, gravimetric and electrolytic analyses are taken up in detail. Each chapter closes with a bibliography on the metal concerned. Antimony, tin, lead and copper are dealt with. Chapter five takes up the determination of magnesium and bismuth in babbitt, the qualitative analysis of babbitt and gives a bibliography on white metal analysis. Chapter six is devoted to notes on the manufacture of babbitt, examples of calculation, the sampling of babbitt metals and a bibliography of metallurgy. To the works chemist this book of 170 pages will prove an admirable aid where anti-friction metals, etc., are concerned.



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INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES



TRADE GOSSIP

Victory for Moderation.—The organizer of the International Unions in the West, Mr. R. A. Rigg, has just completed a tour of the West. He states that there is very little sentiment in that district for the principles of the O.B.U. and the unions are practically all lining up with the Internationals.

Estimates Soon Ready.—Sir Adam Beck has assured the citizens of Galt through the mayor, that an estimate of the cost of the proposed Hydro Radial System in this district will be made by the new year. The municipalities will then be able to submit the by-law to the electors.

Building Firms Amalgamate.—The Norcross Brothers Company, of Worcester, Mass, and Anglins, Ltd., of Montreal and Toronto, have amalgamated their interests with the object of creating an organization large enough to handle all the big building that will be carried out in Canada.

Fire Does Small Damage.—The three-storey building of the Gold Medal Furniture Company at Van Horne and Bartlett Avenue, Toronto, was visited by fire which did damage to the extent of $500. The damage was confined to the contents, the building being unhurt.

New Power Company.—A Dominion charter has been obtained for the Wendigo Power Company, which has been capitalized at $1,000,000. The plant of the company will be twenty miles south of Larder Lake, and the head office at Guelph. Water powers on Wendigo Lake and the Blanche River will be developed.

American Army Stores in France.—The property of the American Expeditionary Force now in France, with the exception of the stores required by the American soldiers still in that country, is to be sold to the French Government. The price is said to be $400,000,000, and the method of making payment will be by 10 year gold bonds bearing interest at 5 per cent. from August, 1920.

Ask Delay in Freight Rate Increase.—The Winnipeg Board of Trade, Shippers' Bureau, has sent a wire to the Board of Railway Commissioners, Ottawa, asking for a delay until October 1st or later in the increase granted in express rates. The reason given for the request is that the rates discriminate against the West, and that there are many discrepancies in the schedule.

Strike Breakers Won't Work.—A gang of men brought from Midland to Meaford by the Seaman-Kent Company with the object of breaking the strike of men, refused to work. A scow with 140,000 feet of lumber is waiting to be unloaded, as are a number of Grand Trunk cars. The situation will be aggravated by the lumber in the dry-kilns being exhausted shortly, with no green lumber to take its place.

Largest Airplane Engine.—The Sunbeam Works at Wolverhampton, England, have been recently testing what is said to be the largest airplane engine in the world. The engine is a twelve cylinder one, the cylinders being arranged diagonally. The horsepower expected to be developed is 900 at normal speed, and the weight per horsepower is less than two pounds.

Some Iron Workers Return.—A large Toronto foundry, having offered the moulders 75 cents an hour with an 8-hour day, about twenty men returned to work under these conditions. More will be taken on when production becomes normal. It is understood that a brass-working shop has also made a settlement with its striking employees, but otherwise the situation is as it was.

To Buy Power.—The clerk of the York Township Council has been instructed to write to the Ontario Hydro-Electric Commission, requesting that negotiations be opened to purchase the lines of the Toronto Electric Light within the township. The council is preparing to extend the Hydro through the thickly settled districts, and with only one power company the expense could be lessened considerably.

Wheat Price is Fair.—The general consensus of opinion on the rate fixed by the Wheat Board and approved by the Government is that it is a fair one. The West was under the impression that the rate would be set at $2.25 per bushel, but the award of the Board, $2.15, should be satisfactory. The Government may possibly be a loser at this price, while if a higher price is realized the farmers will receive the benefit of the balance.

Colliery Loses Three Days.—Owing to a dispute over the employment of two men on the bankhead, a colliery of the Sydney Reserve mine has been idle for three days. The disagreement rose over the fact that two men had been employed to push the boxes on and off the scales, and the company thought that one should be sufficient. The men finally resumed work on the understanding that when production was increased sufficiently two men would again be employed.

Making Money From Moss.—The swamp lands in the vicinity of Brockville are to be used as money producers, the medium being the moss that is found in abundance thereon. Three carloads of this moss are being shipped to Rochester, N. Y., for use by nurserymen and florists, who wrap it around the roots of trees that are being shipped, and also in preserving cut flowers. The moss is sold by the cord and brings a good price.

Restrictions Removed.—The British Treasury Department has announced the removal of certain war time restrictions on the export of capital. Hitherto, money could be remitted only for the purpose of paying for merchandise bought abroad. Securities which are held abroad can now be sold on the Stock Exchange provided that they have not been in enemy ownership since the outbreak of the war. Remittances cannot be made abroad for the purchase of any form of property.

Cable Operators Strike.—Something new in the way of strikes has been introduced by the Western operators of the Commercial Cable Company's lines in Canada and the United States. They went out on strike at midnight, the complaint being that they were receiving less money than the company's European operators. They will stay out 48 hours, then return to work for 48 hours, and strike again for 48 hours. This will be continued till their demands are met.

Imperial Trade Opportunities.—The Canadian Trade Commissioner for New Zealand, Mr. William A. Beddoe, has been visiting Sydney, N.S. While there he took occasion to visit the steel plant. In conversation with the officials of the company he stated that there was a good demand for steel products, and this was increasing. The only difficulty in the way was the shortage of ships, and the situation in that respect should improve every month.

Paper Mill For Morristown.—The property owned by the Gillies Brothers at Morristown, directly opposite Brockville, who used the plant as their American

depot, has been sold to representatives of Hearst, the American publisher. It is said that he will erect a mammoth paper mill on the site. Gillies Bros., who are large lumber mill men at Braeside, near Arnprior, formerly conducted a lumber business at Morristown, but closed down when lumber prices rose so high during the war.

The Board of Commerce.—The third member of the newly-formed Board of Commerce has been chosen and appointed in the person of Mr. F. A. Acland, Deputy Minister of Labor. Mr. Acland has been appointed without salary. The appointment, it is understood, is to be temporary, and the Government at a later date, after conference with Judge Robson and Mr. O'Connor, will appoint a permanent member. It is thought that for the first period of the board's activities the experience of Mr. Acland in high cost of living problems, etc., will be of great value.

New Industry for N.B.—The Hardwood Last Block factory, which was spoken of some time ago as about to be located at Mullin's Brook, York County, N.B., is now being built. The site is about four miles from McGiveny Junction on the Canadian National Railway. The interest behind the enterprise is H. Mobbs, of Kettering, England, said to be the largest maker of last blocks in the world. Between one and two hundred persons will be employed to begin with, and the manufacturers have entered into an agreement with the Nashwaak Pulp & Paper Company for 3,000,000 feet of hardwood lumber.

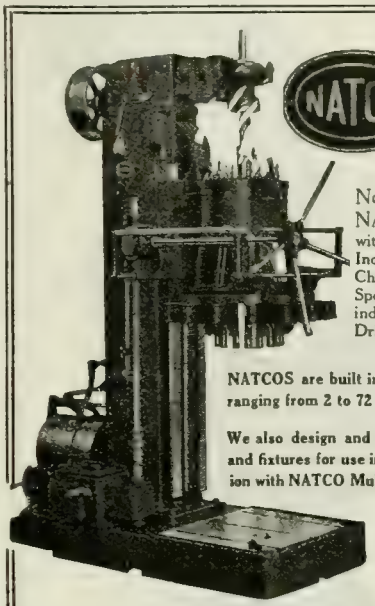
Credit Men Want Probe.—The annual general meeting of Canadian Credit Men's Association, held in Winnipeg under the presidency of Mr. G. N. Jackson, had something to say about increased telegraph rates. They put on record the demand that a thorough and searching investigation should be made by the Railway Board of the telegraph companies' request for higher rates. The alleged discrimination in rates was also mentioned as an object for investigation. The president of the association gave the opinion that in these days of high costs the companies should be pleased if they could make ends meet.

MARINE

London.—The arrival of the Cunard liner "Caronia" in the port of London will be somewhat of an event, the "Caronia" being the largest vessel to enter the port up to date. She is 675 feet long, with a tonnage of 20,000, and will dock in London after landing her Continental passengers in Cherbourg.

Quebec.—The Dussault Company of Levis, which purchased the abandoned wreck of the Canadian Government steamer Montmagny, has floated the vessel after being sunk for four years. The Montmagny was sunk by a collier in thirty feet of water off the Island of Orleans, and three lives were lost.

St. John, N.B.—The War Moncton, a wooden steamer built by Grant & Horne, was launched successfully recently, and is now ready to go on her trial trips, just twelve months after the keel was laid. She is 250 feet long by 43 feet 6 inches beam and 25 feet 6 inches moulded depth, and has a gross tonnage of 2,300 tons. She is a sister ship to the "War Fundy," built at the same yard last year.



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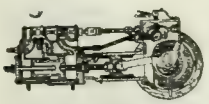
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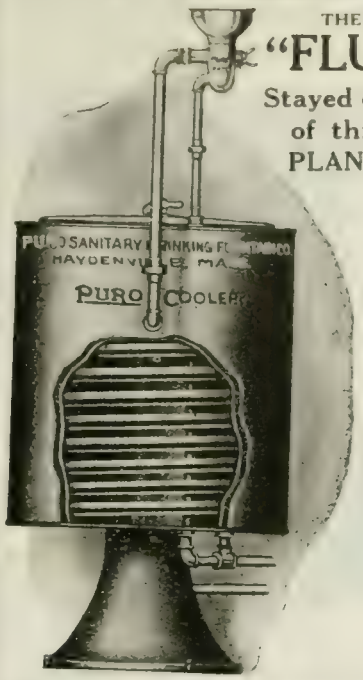
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London.—The standard vessels laid down by the British Government have been distributed by Lord Inchcape, chairman of the P. & O. Steamship Company, without any profit to himself or interest to his firm. The amount of tonnage distributed was 1,400,000, contained in 196 ships, and the value of which was $150,000,000.

Sault Ste. Marie.—The steamer Collingwood, drawing 19 ft. 6 in., was compelled to back out of the locks on the Canadian side and go over to the American side before she could get through. The 19 ft. 6 in. was just one inch more than the depth of water that could be put in the locks on the Canadian side. A strong west wind that backed up the water in the river was the cause of this.

Montreal.—There is considerable indignation in Montreal over the action of the Montreal Harbor Commissioners, in increasing wharfage rates without giving the shipping federation or exporters and importers a chance to discuss them. Mr. Robb, the manager of the shipping federation, pointed out that this was an order in council, and how the council could pass such a measure without giving the other side a chance to be heard was more than he could understand.

Brockville.—George C. Sherman, president of the Taggarts Paper Co., and three companions, George W. Mercier, Gus Seymour, and William Lambert, had a narrow escape of drowning when the motor boat they were in blew up. The boat was going along at her usual gait when something happened in the cylinders which caused the whole engine to go up, the boat catching fire as the result of the explosion. The men were rescued with difficulty.

Lauzon. — The Davey Shipbuilding Company of this town have just completed successfully the building of a new bow for the steamer North West. It will be recalled that this vessel was being brought down the lakes in halves last fall, and the bow end was lost in Lake Ontario, together with two men. The stern end was brought on down to Quebec and placed in the Davey dry dock at Lauzon, where the new bow has been made an exact replica of the one that was lost.

Vancouver. — The shipyard of J. Coughlan & Sons, Vancouver, can now boast of its own weekly newspaper. The paper, which contains sixteen sheets, is devoted to live news about the plant and the happenings therein. For the present the paper is known as the J. Coughlan & Sons Plant Publication, but steps are being taken to provide it with a suitable title. One of the means employed to stir the imaginations of the employees is to offer a prize of $10 for the most suitable name. Among the items concerning production is one giving the name of the champion riveter of the yard at the time of publication. For July the best man was E. Peterson.

TENDERS

The Department of Indian Affairs is requesting tenders for the construction of an Indian boarding school at Chapleau, Ont. Tenders will be received up to September 15, and plans and specifications can be obtained from A. D. McNabb, Indian agent, Sault Ste. Marie.

Post Office at Sudbury and North Bay, and J. T. Godfrey, Indian agent, Chapleau.

The Leaside Housing Company are asking for tenders for Leaside houses which will be received up to September 10. Plans and all information can be obtained after September 1 at the office of the Canada Wire and Cable Co., or from William Lyon Somerville, architect, Imperial Bank Building, corner of Yonge and Bloor, Toronto.

BOOK REVIEWS

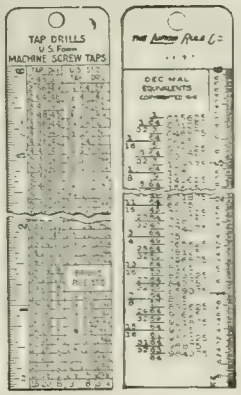
The Canadian Mining Manual for 1918, edited by Reginald E. Hore. The Times Publishing Co., Toronto and Quebec.

This well-known annual has been enlarged considerably over former years and contains much new material of a statistical and mining nature about Canada's mineral wealth. In this new edition is to be found information concerning all minerals and metals produced in Canada, and all metallurgical and mining companies operating in Canada. Two chief objects have been achieved: to present in concise form matter of interest to persons connected with the industry, and to attract attention to the opportunities for the development of Canada's mineral resources.

The volume is exceptionally well illustrated with colored plates, half-tones and line cuts. A large number of mineral specimens are shown in natural size and color, these plates including some of the best reproductions of ore that have ever been printed. In the section of the book devoted to mine products useful information concerning the character, use and occurrence of each mineral treated. The minerals are dealt with in alphabetical order and the amount of space given to them varies. Owing to the great demand recently for information concerning certain minerals and metals special attention is given to war minerals such as magnesite, fluorite, pyrite, molybdenite, etc. A second large section of the book is devoted to mining and metallurgical companies operating in Canada. In each case is given the office address, the location of the property, and the name of the manager. In most cases capitalization, names of directors, officers, nature of operations, recent financial statement and record of production during the last year are given. These companies are treated of in alphabetical order.

Contents

Mineral production in Canada in 1917; Canada's water powers and their relation to the fuel situation; metals and metallurgical research; annual meeting of the Canadian Mining Institute; Alberta coal mines; the gold industry; the magnesite industry; fluorspar mining in Ontario; oil prospecting in Ontario; tungsten ore deposits in Manitoba; the Matachewan gold area; Molybdenite mining in Quebec; copper mining and refining in British Columbia; mining in Northern Manitoba; mining companies operating in Canada; mining companies listed according to product.



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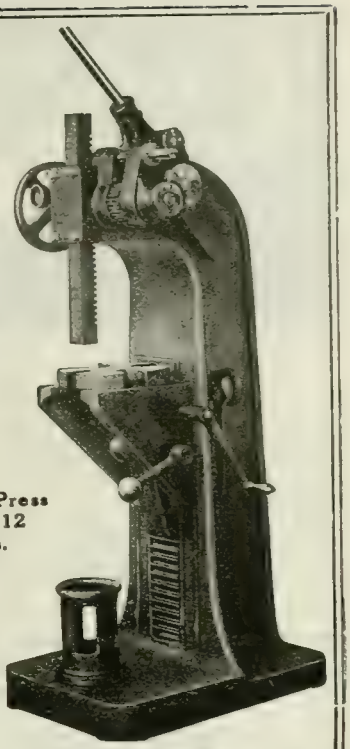
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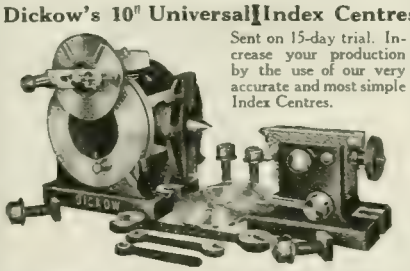
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BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works

Allentown, Pa., U.S.A.

WANTED

Canadian Agents for high grade line of Annealing Furnaces

Apply

Box 624

Canadian Machinery

Mining Machinery for Sale

Alley & McLellan Air Compressor 600 ft. at 100 lbs. pressure, 125 H.P. Motor, heavy duty 600 R.P.M. 3 phase 60 cycle 550 volts.

Ingersoll-Rand 800 ft. Air Compressor.

1 Tube Mill Fraser & Chalmers 5 x 22.

1 Power & Mining 5 x 22.

Also large assortment of Pumps, Tanks, Classifiers, Boilers and Mining Equipment for sale.

Zenith Coal & Steel Products

Limited

402 McGill Building Montreal

1410 Royal Bank Bldg., Toronto, Ont.

NOW!

You've been going to send in that ad for weeks, so why not mail it now for next week's issue.

Canadian Machinery

43-53 University Ave., Toronto

WANTED

1—"Used" Plate Punch and Shear 36" gap, capacity 7/8" hole in 7/8" plate

—also—

1—"Used" Air Compressor, steam actuated — compound steam—simple air —12" x 12" cylinder.

Both machines must be modern in design and in good operating condition. Offers with full details, price and shipping point, will be considered.

I. MATHESON & CO., LTD.

Builders of Machinery

New Glasgow, - Nova Scotia

In the Machinery Hall at the Canadian National Exhibition

We have on exhibit and in operation

Type A & B Briggs Manufacturing Milling Machines.
Steptoe Single Pulley Drive 24" Shaper.
Bath No. 2 Universal Grinder.
Fitchburg 8 x 36 Cylindrical Grinder.
Conradson Heavy Duty No. 3 Plain Milling Machine, Single Pulley Drive.
Thor Pneumatic and Electric Tools.
Adams Short Cut Lathe.
Lodge & Shipley 24" Three Step Cone Engine Lathe.
Sliding Head, Back Geared and Sensitive Drills.
Hardinge Bros., Inc. ("Cataract"), No. 7 Turret Tool Post Lathe.
Quick Change Precision Lathe.
R 4 Underdrive Bench outfit, equipped with Nos. 3, 4, and 5 Precision with screw cutting and grinding attachments.
Bench Miller and Drill Press.

Experts from the factories will be on hand to demonstrate machines and answer all enquiries.

You are cordially invited to call at our booth and inspect this machinery.

GARLOCK-WALKER MACHINERY COMPANY, LIMITED
32-34 Front St. West, Toronto
MONTREAL TORONTO WINNIPEG

PARTIAL LIST OF TOOLS

2—60" Bullard Vertical Boring Mills
1—60" Niles Vertical Boring Mill
No. 4—B. & S. Plain Miller
1—36" x 36" x 8' Gray Planer, two heads
No. 3—Cincinnati Universal Miller
5—No. 0 Steptoe Hand Millers
13" x 5' 6" New Carroll-Jamieson Quick-Change Lathe
14" x 6' New Carroll-Jamieson Quick-Change Lathe
15" x 6' New Sidney D.B.G. Quick-Change Lathe, swing 17"
15" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 17"
17" x 8' New National Quick-Change Lathe
3—17" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 19"
17" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 19"
18" x 24" New Rahn Larmon Lathe, D.B.G. Quick-Change
19" x 10' New Sidney D.B.G. Quick-Change Lathe, swing 21"
9—19" x 8' New Sidney D.B.G. Quick-Change Lathe, swing 21"
25" x 14' New Sidney D.B.G. Quick-Change Lathe, swing 27"
33" x 14' Putnam, arranged for Motor Drive
6' Western Radial Drill
5' Bickford Single Pulley Drive Radial
100-lb. New Little Giant Hammer
50-lb. New Little Giant Belt Hammer
25-lb. New Little Giant Belt Hammer
30-ton Watson & Stillman Hydraulic Press

FRANK TOOMEY INC.
27 North Third Street PHILADELPHIA, PA.

SPECIALISTS
In Railway, Marine and Industrial Supplies

Duntley Dayton Pneumatic Tools.
Daniel's P.P.P.
Ebonite Packing.
Pump Valves.
International High Pressure Sheet Packing.
International Red Rubber Packing.
Plastic Metallic Packing for Piston Rods and Valve Stems.
Paxton & Mitchell Locomotive Rod Packing.
Rapid Hose Coupler, for all Hose Connections.

Write or Wire Your Requirements

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371 St. James St., Montreal

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THE
TORONTO IRON WORKS
LIMITED

HEAD OFFICE: ROYAL BANK BLDG. TORONTO WORKS: CHERRY STREET

Oil Storage, Gasoline Tanks, Air Receivers, Pneumatic Water Supply Tanks, Smoke Stacks, Boiler Breeching, Riveted Steel Pipe, Bins and Hoppers. Heavy and light steel plate construction erected anywhere.

WE CARRY

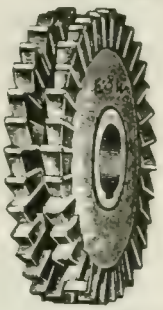
High Speed Reamers, Cutters and Drills

IN STOCK HERE

Prompt Service

The J. A. M. Taylor Tool Co.
Machine Shop Supplies
318 Stair Building Toronto

Elliott & Whitehall Machine & Tool Co.
GALT, ONTARIO, CANADA
MILLING CUTTERS AND SMALL TOOLS



We manufacture the following tools, etc.

Standard and Special Milling Cutters of all descriptions, Gear Cutters, Hand Reamers, Shell Reamers, Chucking Reamers and Taper Pin Reamers, Lathe Mandrels and Arbors, Metal Stamping Dies, Gauges, Jigs and Fixtures, Etc.

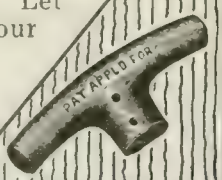
All equipment required for rapid and economical production of interchangeable parts. Prompt attention to all work.

ASK FOR OUR NEW CATALOGUE No. 10.

TOOLS & STAMPINGS



We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.

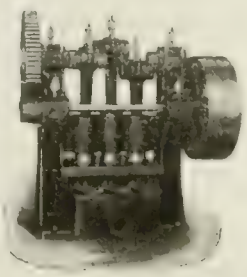


HOMER & WILSON
Stamping and Tool Works
1-5 Lancaster St., Hamilton

VICTORIA Special Machinery
DESIGNS PATTERNS
CASTINGS FORGINGS
Send for Catalogue
Victoria Foundry Co., Limited, Ottawa, Canada

WELDING APPARATUS AND . . . **SUPPLIES**
The REGO 100% Efficient Welding Torch
Saves Oxygen Eliminates Flash-Back Better Welding
Write to us for anything and everything you need.
WELDING & SUPPLIES COMPANY
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SPECIAL MACHINERY
Built to Order
Also gauges, punches, jigs, dies, small tools, etc.
Prompt Service.
Moderate cost.
Send Blueprints for estimate.
Brown Engineering Corporation
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415-419 King St., W. Tel. Adel. 425
MADE IN BR·EN·CO CANADA



Place a trial order for one of our Pumps and find out the reason that

Smart - Turner Pumps

always bring repeat orders.

THE SMART-TURNER MACHINE CO.
LIMITED
Hamilton, Canada

Don't Keep It--Sell It

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor
or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

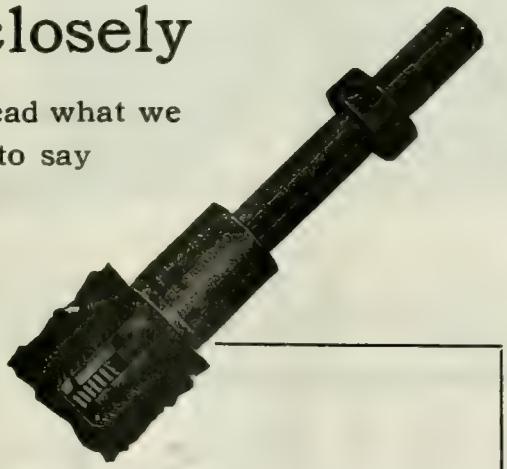
A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue TORONTO, ONT.

Look at this again —closely

and read what we have to say below

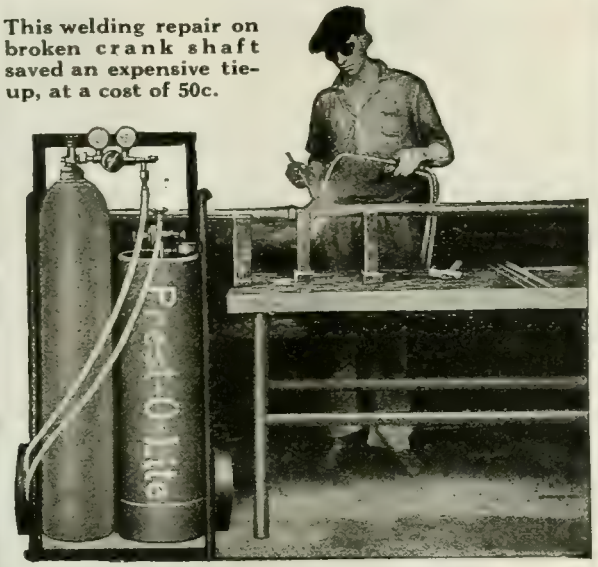


WHEN a tap breaks off close or below the surface, you'll find the Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

Oxy-Acetylene Welding and Cutting

This welding repair on broken crank shaft saved an expensive tie-up, at a cost of 50c.



Reduces Repair Costs Saves Time and Money

Oxy-Acetylene Welding is saving hundreds of thousands of dollars annually in Canadian Factories, Mills, Mines, Machine Shops and wherever metal or machinery is used. Broken machinery parts, tools and defective castings are quickly and permanently repaired. Many economies and advantages are derived from welding in construction as well as repairing.

Prest-O-Lite PROCESS

employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene is backed by Prest-O-Lite Service, which insures prompt exchange of full cylinders for empty ones. Provides dry, purified gas, insuring better welds, quicker work and lower operating cost.

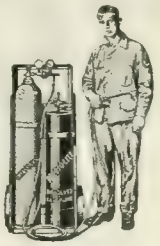
Apparatus consists of an equal pressure blow pipe, automatic regulators and gauges, and all necessary equipment. Adaptable for oxy-acetylene cutting by the addition of special cutting blow pipe.

Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene. Any average workman who understands metals can learn the welding process quickly and easily.

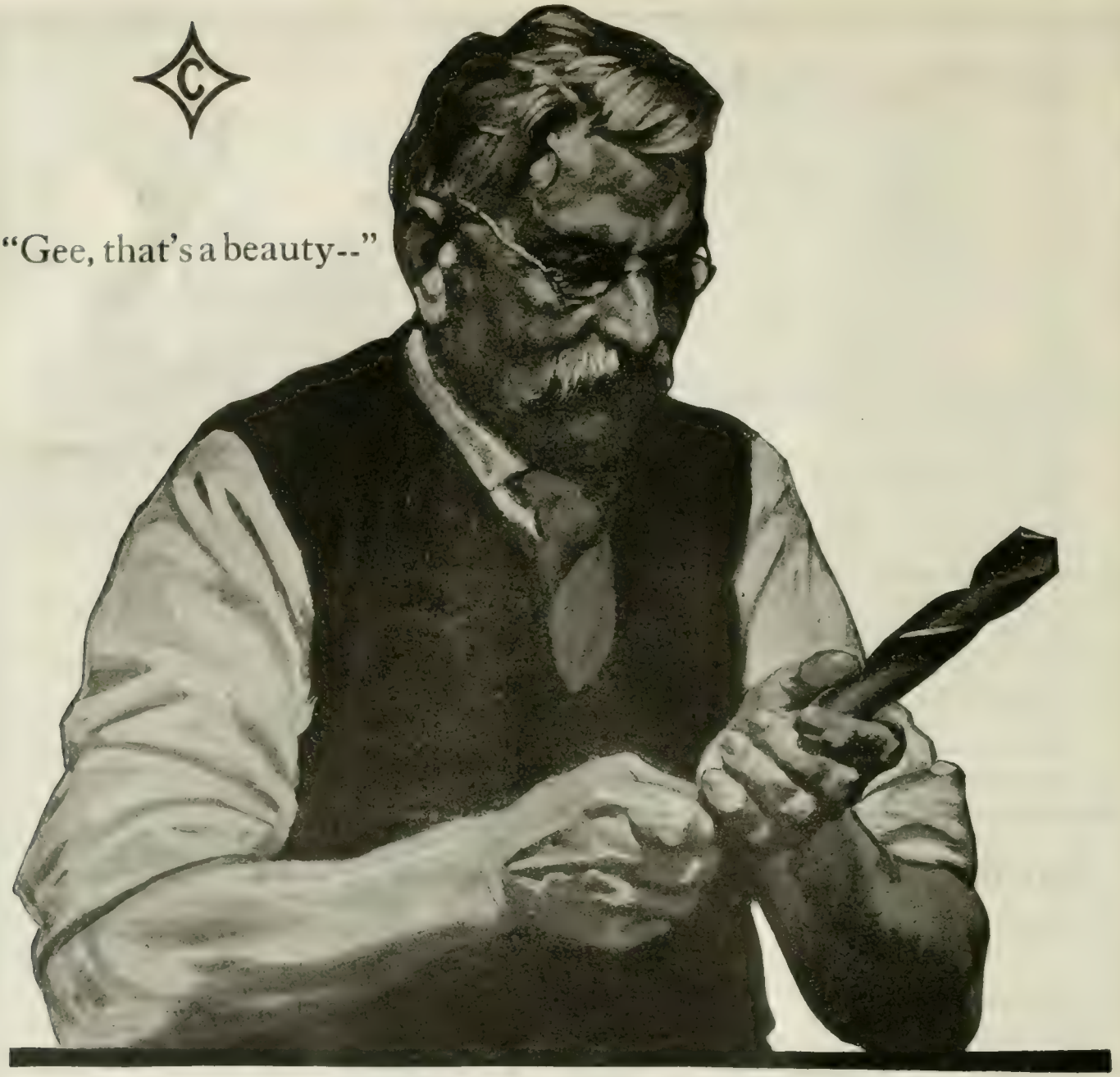
We will gladly send illustrated literature and interesting data showing actual instances of savings made by others. It may suggest valuable ideas to you. Write for it.

Address Department C—107

Prest-O-Lite Company of Canada, Limited
PREST-O-LITE BUILDING
Corner Elm St. and Centre Ave.
TORONTO
Plants at: Toronto, Ont., Merritton, Ont. Shawinigan Falls, P.Q., St. Boniface, Man.



World's Largest Makers of Dissolved Acetylene



There's a Real He-Man Drill

It's a CLEVELAND



THE CLEVELAND TWIST DRILL CO., Cleveland, New York, Chicago

Agents for Europe, CLEVELAND TWIST DRILL CO. (GREAT BRITAIN), Ltd., 36-37 Upper Thames St., London E.C.4.

The Canadian Who Bullied the Bolsheviks!

WHEN war broke out, Colonel "Klondyke" Boyle took across, at his own expense, 200 staunch Yukon volunteers. He was sent to Southern Russia, and in six weeks turned the transport system there from chaos into efficiency. He fed the starving Russian and Roumanian armies. He arranged temporary peace terms between Bolsheviks and Roumanians. Aided by twenty Chinese murderers and a brave Canadian girl, he bluffed the Bolsheviks and Austrians, in a tremendous exploit which won for him the title "Saviour of Roumania," and the personal thanks of the Roumanian royal family.

Read this story of "Klondyke" Boyle, by Arthur Beverley Baxter, in September MACLEAN'S—it starts on page 13.

"Growing Under Gouin"

—tells the amazing story of development of Quebec Province during the past fourteen years —in road-building, finances, industries and education.

"Meet Mr. Habitant"

—What does the rest of Canada know about the Habitant of to-day? Does he talk like Drummond's poems? This article, by Thomas M. Fraser, forcibly depicts the assets Canada has in French-Canadian stability and thrift, and will go far to remove any lingering prejudices which may exist in some minds.

Other Big Features

The Crowning of the King—By J. K. Munro, the pungent, pithy, political pundit.

Nuorteva's Propaganda—By C. H. Cahan, K.C., recently Director of Public Safety.

The White Eagle at Niagara—By Major C. R. Young, late adjutant Polish Army Camp.

The Problem of Our New Canadians—By Nellie McClung.

His Majesty's Well-Beloved—By Baroness Orczy.

Canada's Great National Asset—By D. B. Hanna, president Canadian National Railways.

Teddy Bear—A wonderful, poignant, Robert W. Service poem.

On Leave—A light, frolicsome story by Harry Bailey.

Evil Spirits—Another Bulldog Carney story, by W. A. Fraser.

Ebb and Flow—A new story by C. W. Stephens, who wrote "Man and Wife."

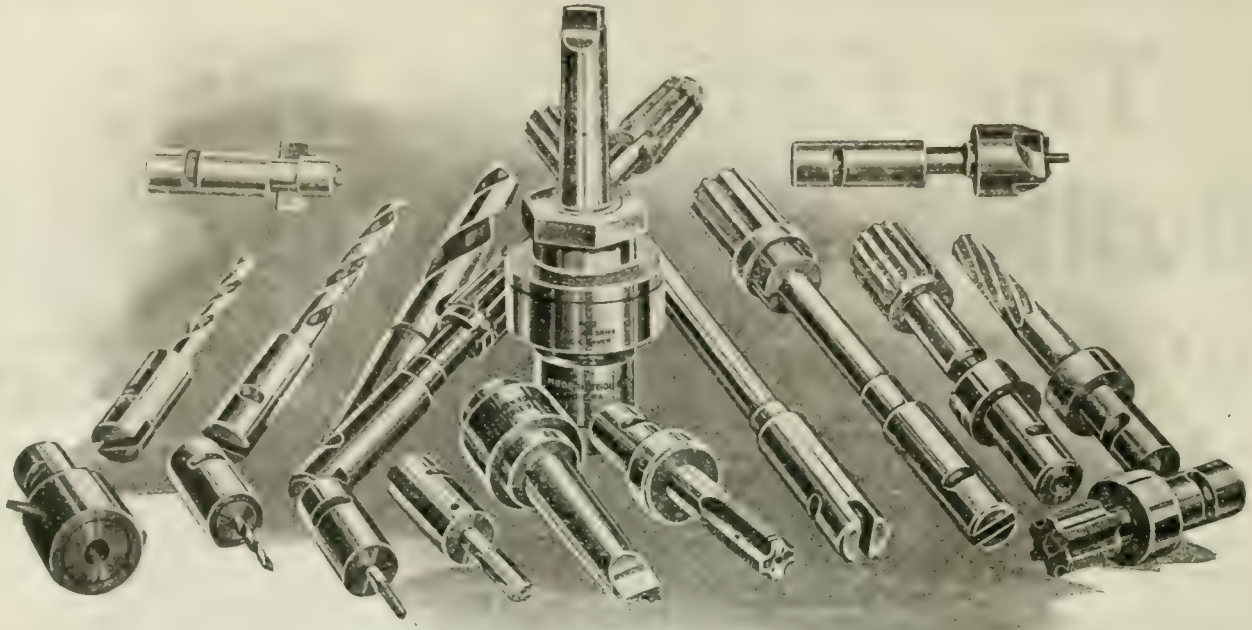
Over 70,000 Canadian Families Buy

MACLEAN'S

"CANADA'S NATIONAL MAGAZINE"

SEPTEMBER ISSUE *Now On Sale At All News Dealers* **20c**

If there are no newsdealers in your town, or if your newsdealers cannot supply you, send 20 cents for a sample copy or $2.00 for a whole year's subscription to MACLEAN'S MAGAZINE, 143-153 University Ave., Toronto, Can.



Modern "Magic" Chucks

—Often make unnecessary the purchase of expensive multiples.

Take a look at the picture above. All the tools shown may be used in a magic chuck on drill press or other revolving spindle machine.

The Magic Chuck virtually transforms a single revolving spindle machine into a multiple with as many spindles as you have tools to use. Especially valuable for successive operations which may be performed without resetting the work. For drilling and tapping successive holes of various sizes on one job the Magic Chuck is even a more advantageous tool than a multiple.

The cost is so small that no shop should be without several. You can well afford to equip every revolving spindle machine.

Other Modern Tools

—Modern Plain Grinders
—Modern Universal Grinders
—Modern Internal Grinders
—Modern Chaser Grinders
—Modern Self-Opening Die Heads
—Modern Collapsible Taps
—Modern Tapping Attachments

Reclaiming Broken Tang Drills

One of the collets in the Magic Chuck equipments is for making useful broken drills without necessity of milling keyway or flat spots.

The saving in this use alone will repay the entire initial cost many times.

Send for complete technical bulletin.

MODERN TOOL CO.

MAIN OFFICE AND WORKS: **ERIE, PA.** STATE AND PEACH STREETS

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Export Department: No. 2 Rector St., New York
Canadian Agents: Rudel-Belnap Machinery Co., Ltd., Toronto and Montreal
California Representatives: Herberts Machinery & Supply Co., Los Angeles and San Francisco

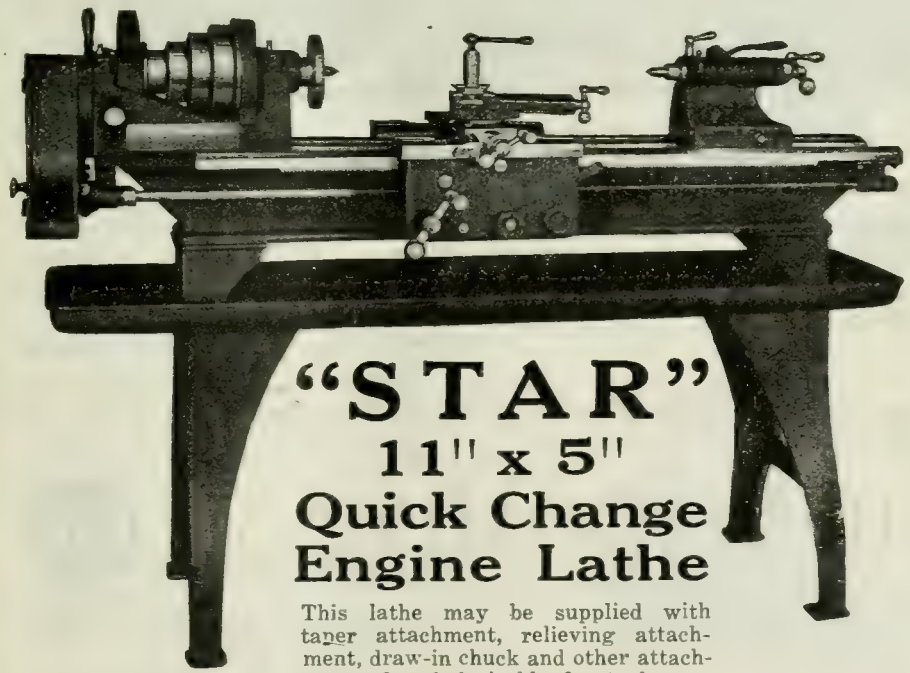
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ESTABLISHED 1847 TORONTO, ONTARIO 19 VICTORIA STREET

We solicit enquiries for Foundry and Factory supplies, including---

Bar Iron, Mild Steel, Sheet Steel, Black and Galvanized, Carbon and High Speed Steels, Roofing Materials, Pipe and Fittings, also Machine Shop Supplies, such as Files, Drills, Fine Tools, Set and Cap Screws, Etc.

For Small Tool Room Work—



"STAR"
11" x 5" Quick Change Engine Lathe

This lathe may be supplied with taper attachment, relieving attachment, draw-in chuck and other attachments found desirable for tool room work.

The First Choice of All Who Know

Use a small lathe on your light tool room work. "Star Lathes" not only ensure greater accuracy but save power, labor and space.

Instal a "Star" and you'll soon realize that there is much work that can be handled far more cheaply than is now thought possible.

May we send our catalog?

The Seneca Falls Mfg. Company, Inc.

366 West Falls Street
SENECA FALLS, N.Y.



Photographs and data by courtesy of our customer.

And to-day it produces these seamless Taper Drinking Cups at the rate of more than 2100 per hour. Speaks well for "Bliss" Presses, does it not?

This particular "Bliss" No. 3½ Cam Press is being run at about 22 strokes per minute and the operator performs 532 operations per hour, drawing 4 cups at a time.

Certainty of satisfactory service is what the name "Bliss" means to you.

BLISS 1857

E. W. BLISS COMPANY

BLISS 1919

Main Office and Works: BROOKLYN, N.Y., U.S.A.

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DETROIT OFFICE
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LONDON, ENGLAND, Pocock Street, Blackfriars Road, S. E.

PARIS, FRANCE, 100 Boulevard Victor-Hugo St. Ouen

No. 55

VENUS PENCILS

The largest selling quality pencil in the world



BECAUSE of their silky *smoothness* and *uniform* dependability, VENUS PENCILS are in constant use in the offices of engineers throughout the world.

To know the dependable and uniform quality of VENUS pencil in *every* degree, write today for

free samples of the degrees of lead which you prefer.

17 Black Degrees 6B softest to 9H hardest and hard and medium Copying All perfect



American Lead Pencil Co.

238 Fifth Avenue, New York

and Clapton, London Eng.

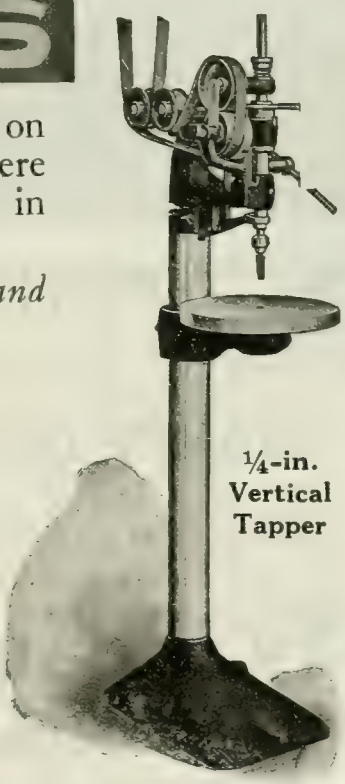
RICKERT-SHAFER TAPPERS

Save Tap Breakage

The *smooth drive* reduces the strain on the taps—they wear longer—and there are fewer delays from taps breaking in the work.

R-S Tappers ensure faster tapping and quicker assembling.

Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on ⅝-in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.



¼-in. Vertical Tapper



Column Type Horizontal Tapper

Write for specifications

The Rickert-Shafer Co.

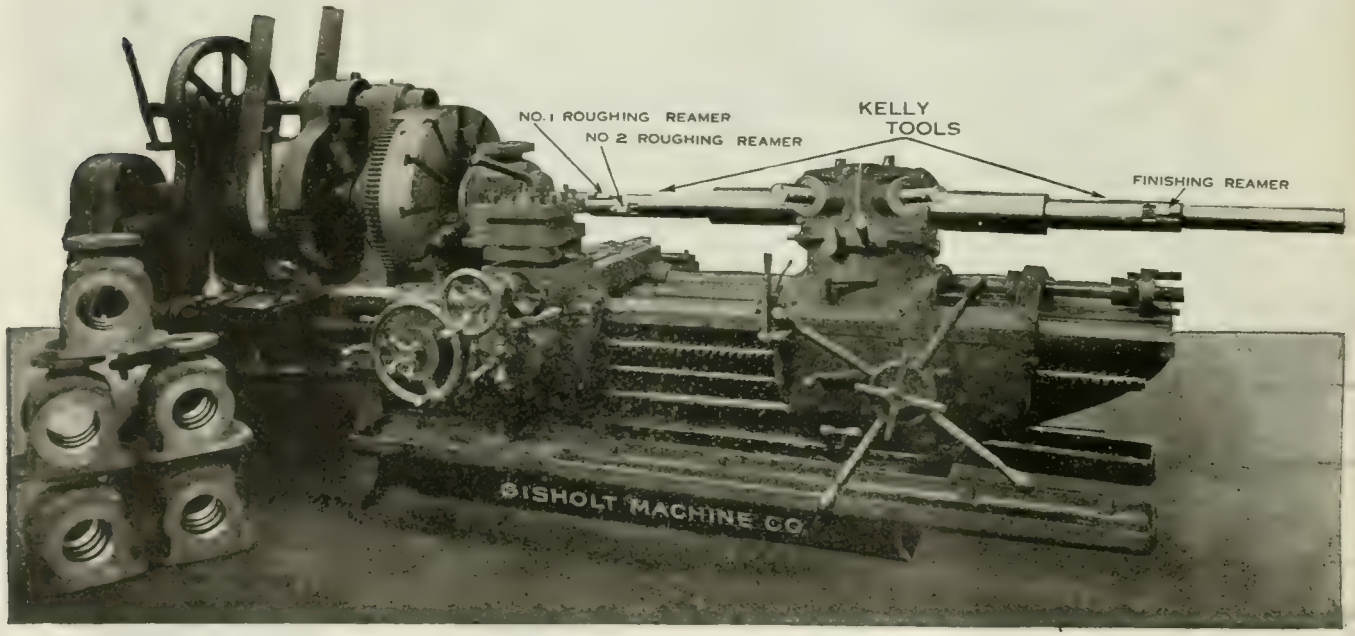
ERIE, PA., U.S.A.

FRED HERBERT, Foreign Agent, Coventry, England.

Kelly PRODUCTION Tools

KELLY tools are shown below in operation upon a 24-in. GISHOLT LATHE. The steam engine valve chests, being machined, are of cast-iron and are rough bored and semi-finished with two reamers in one bar. They are then REAMED with finishing reamers in the other bar. These reamers, being properly piloted, pass over THREE PORTS and give a TRUE, SMOOTH hole to close limits.

The hole is approximately 5½-in. diameter. By inserting a different sized set of reamers IN THE SAME BARS, a much larger sized job of a similar nature is performed.



ADJUSTABLE—REPLACEABLE

High-Speed Steel or Stellite Blades

PROMPT DELIVERIES

Send for our Catalog J-4

The Kelly Reamer Company

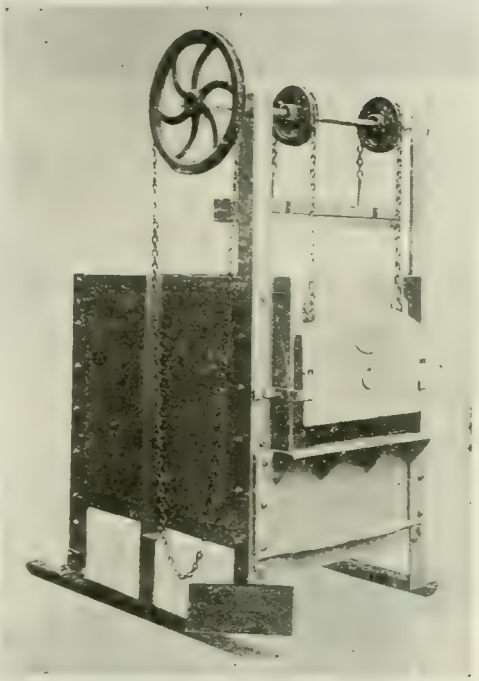
Cleveland, Ohio, U. S. A.

Do These Advantages Appeal

To Your Sense of Economy and Efficiency?

OIL FURNACE
VERSUS
COAL FURNACE

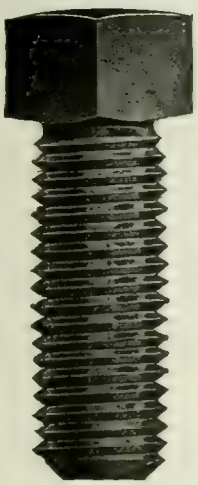
It's economy — requires one-half the space; costs less than half; no chimneys or flues required; instantaneous and perfect control of temperature; higher temperature obtained; no coal ash handlers required; no coal or ash piles; less waste of fuel, because it is shut off instantly; requires much less time to get the required heat. *Can you afford to lose the Advantages of this oil Furnace?*



Write To-day for Full Particulars.

Mechanical Engineering Company,
LIMIED
Room 308, Bank of Toronto Building, Montreal
hree Rivers, Que., Can. Cable Address: *"Mecol"*

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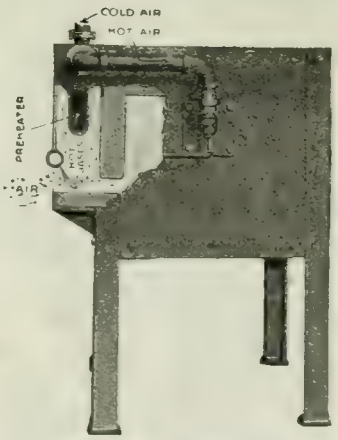


When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

THE
GALT MACHINE SCREW CO.,
LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Merton Company Limited, 49 Common St., Montreal, Que.

Cool Shop This Summer
if you use
ECONOMIZER FORGE



Showing deflection of hot gases, with induced air *toward* the furnace, and the preheating of air for combustion.

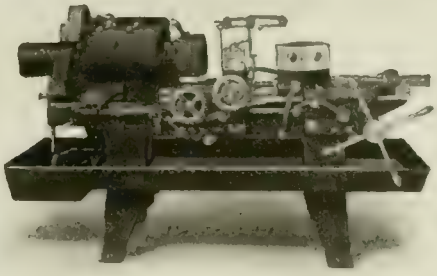
It is economical in fuel, air and power; protects workmen from flame and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into the forge shop.

Write to-day for catalogue 34-T

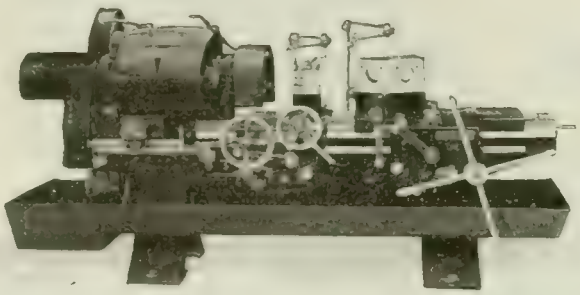
Canadian Representative:
R. J. McLEAN
128 Bleury St., Montreal, Canada.

W. S. ROCKWELL CO. INDUSTRIAL FURNACES ESTABLISHED 1888 NEW YORK

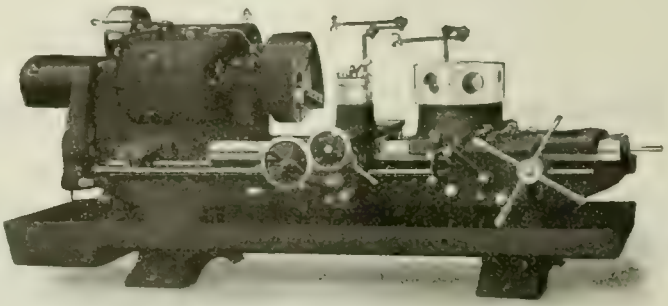




1-B Universal Turret Lathe



2-B Universal Turret Lathe



3-B Universal Turret Lathe

HOW ARE YOU EQUIPPED FOR MACHINING CASTINGS AND FORGINGS?

Are you allowing your machining cost to increase with the steadily mounting cost of labor?

Or are you taking advantage of the labor-saving cost reducing possibilities, to be found in the latest developments in machine tools, to keep your manufacturing cost down to the old level?

The Foster Universal Turret Lathes are built for rapid production. They are rigid and powerful. Your heavy forgings and castings can be machined with speed and accuracy on these machines. The cross slide can be facing while the hexagon turret is boring and turning. As many as five to six cutters are often seen working simultaneously.

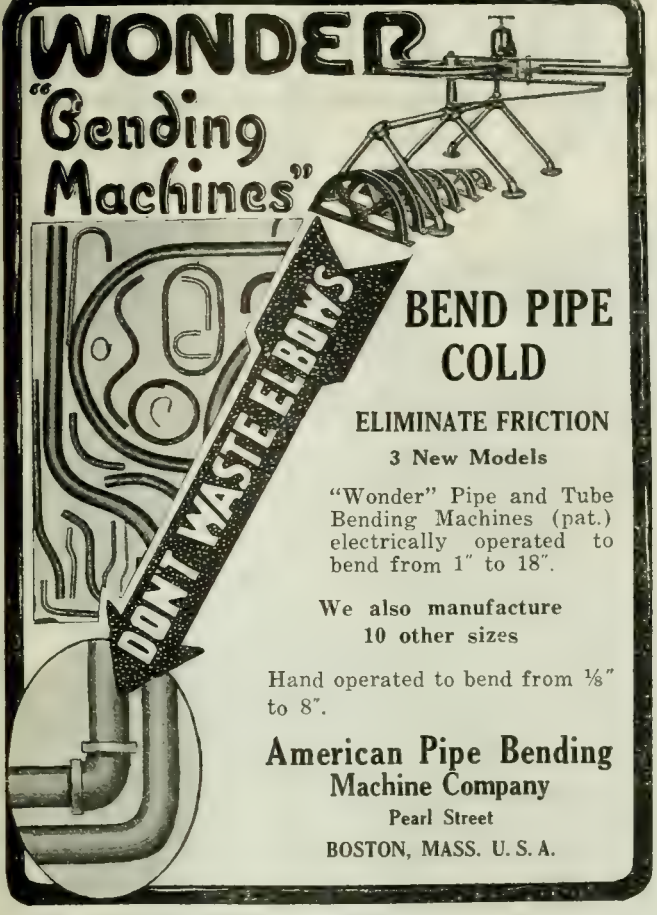
The control levers for the various units of the machine are centralized. The ease and convenience of manipulation saves the operator time and energy and increases his day's production—and your earnings.

Our production engineers will gladly submit a production estimate covering your work. Send us your blue prints.

Is our catalogue in your file?
If not, write for it to-day.

FOSTER MACHINE COMPANY, ELKHART, IND.

WONDER
"Bending Machines"



BEND PIPE COLD

ELIMINATE FRICTION

3 New Models

"Wonder" Pipe and Tube Bending Machines (pat.) electrically operated to bend from 1" to 18".

We also manufacture 10 other sizes

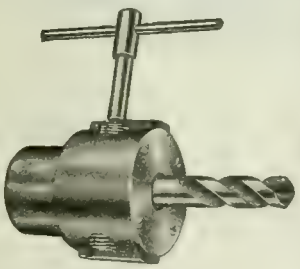
Hand operated to bend from ⅛" to 8".

American Pipe Bending Machine Company
Pearl Street
BOSTON, MASS. U. S. A.

THE
ST. LAWRENCE WELDING CO. LTD.
MONTREAL, QUE.
A. M. BARRY, Managing Director
Office and Works:
138-140 Inspector Street
Telephone Service:
Maritime Branch:
HALIFAX, N.S.
(Long Distance) Main 5779 and at Night, Westmount 3483

CONSULTING ENGINEERS on all kinds of welding.
BREAKDOWN REPAIRS handled at once; just 'phone us and we will be on the job by next train.
OXY-ACETYLENE WELDING of heavy cast iron frames, cylinders, gears, water wheels, etc.
STEEL, any kind of **welding** on parts of large or small machines, tanks, digesters, boilers, shafts, brackets, etc.
Can be welded in place when necessary.
ELECTRIC WELDING on boilers, digesters, leaking tanks, etc.
MARINE REPAIRS undertaken by our Marine Welding Tug which is equipped with Electric and Oxy-Acetylene Welding Apparatus with Compressed Air Plant complete.
OXY-ACETYLENE CUTTING of any kind of steel construction.
PORTABLE WELDING APPARTUS of all kinds with skilled operators always available to repair your breakdown at once.
THERMIT WELDING on all classes of work is a special feature of present activities.

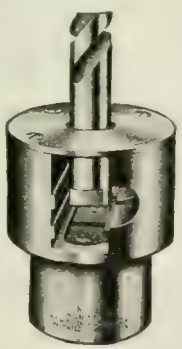
Manufacturers of Steel Tanks, Air Receivers, Welded Tanks, etc.; Electric Welders, Oxy-Acetylene Welders, Boiler Repairs, Lead Burning and Thermit Welding.



UNION

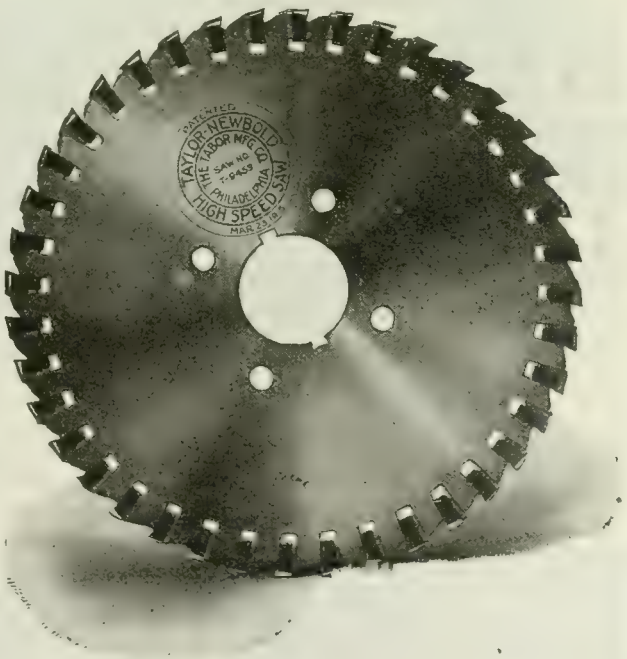
POSITIVE DRIVE DRILL CHUCKS

The Union Drill Chuck is made in seven sizes (0 to 2 inches) with PATENT TRANSVERSE SLOT—so that drills with tenons can be inserted (see illustration). The shank of drill should be squared on two sides to enter the TRANSVERSE SLOT, giving a positive rotation to the drill independently of the jaws, permitting the jaws to centre and align the drill accurately. The drill is held absolutely true and will not slip under the hardest strain. This type of chuck will be found to give the best results on all classes of work from HIGH SPEED drilling to the hard BLACKSMITH and GENERAL REPAIR work.



UNION Manufacturing Co.
New Britain, Conn.
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Makers of a complete line of chucks

THE IMPROVED
TAYLOR-NEWBOLD



INSERTED TOOTH COLD SAW
WRITE FOR BULLETIN T-S
Tabor Mfg. Co., Philadelphia, Pa., U.S.A.

IMMEDIATE DELIVERY

MODEL D-1

SPECIFICATIONS:

RANGE—

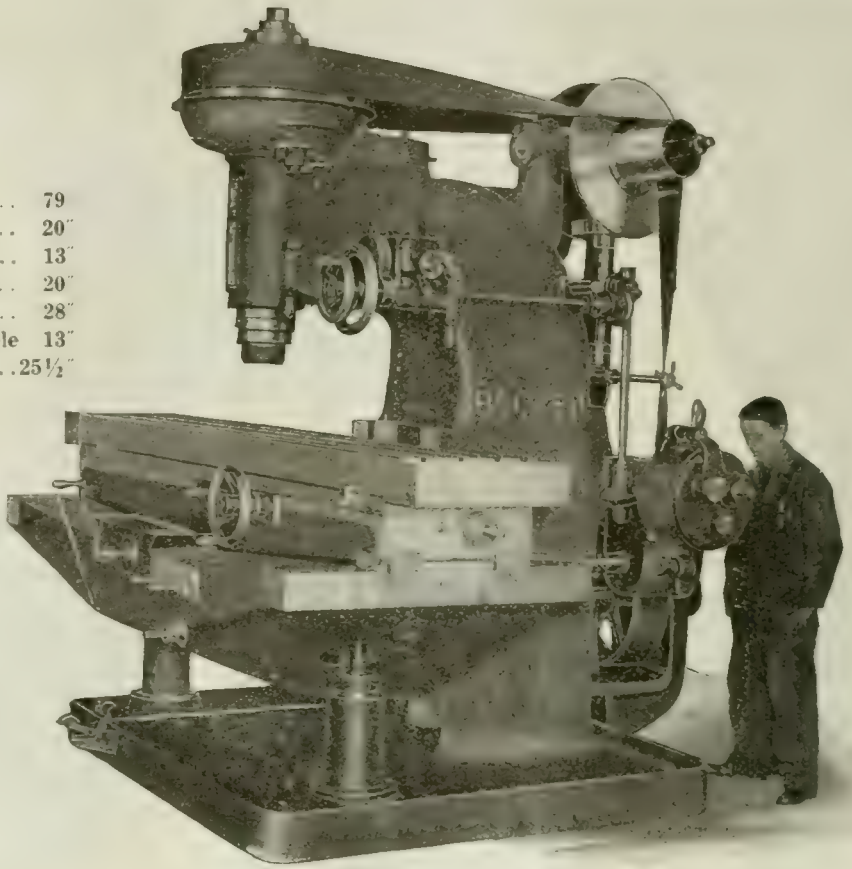
Longitudinal Feed	79
Vertical Feed (Knee)	20"
Vertical Feed (Spindle)	13"
Cross Feed	20"
Max. Distance, Spindle to Table	28"
Max. Distance, Spindle to Rotary Table	13"
Max. Distance, Spindle to Frame	25½"

TABLE—

Working Surface	96" x 20"
Overall	110" x 20"
3 T-slots	⅝"
Length of Carriage	96"

WEIGHT—

Net Approx. 18,600 lb.



BECKER BELT DRIVEN MILLERS

THE MACHINE THAT GIVES THE SMOOTH FINISH

Massively constructed to handle work requiring a powerful machine tool, the Model D-1 fills a distinct want in every large plant.

The control is centralized so that te machine can be advantageously operated by one man, yet none of the Becker features have been sacrificed in its design, in fact, these features have been improved along the lines of greatest efficiency.

Note the large range—the rigid design of the knee supported by two perfectly co-ordinated elevating screws—the wide table, and powerful drive. These are some of the salient points of the Model D-1—Write for further information—To-day—NOW.

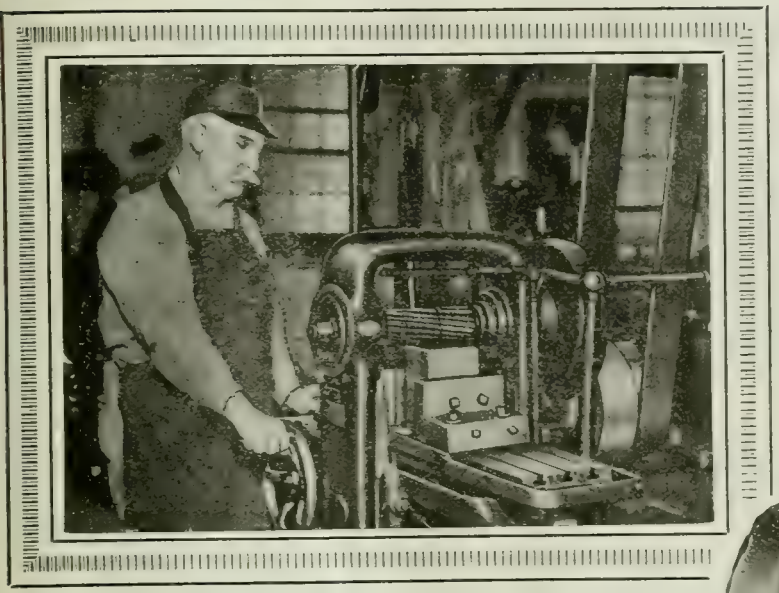
BECKER MILLING MACHINE CO.

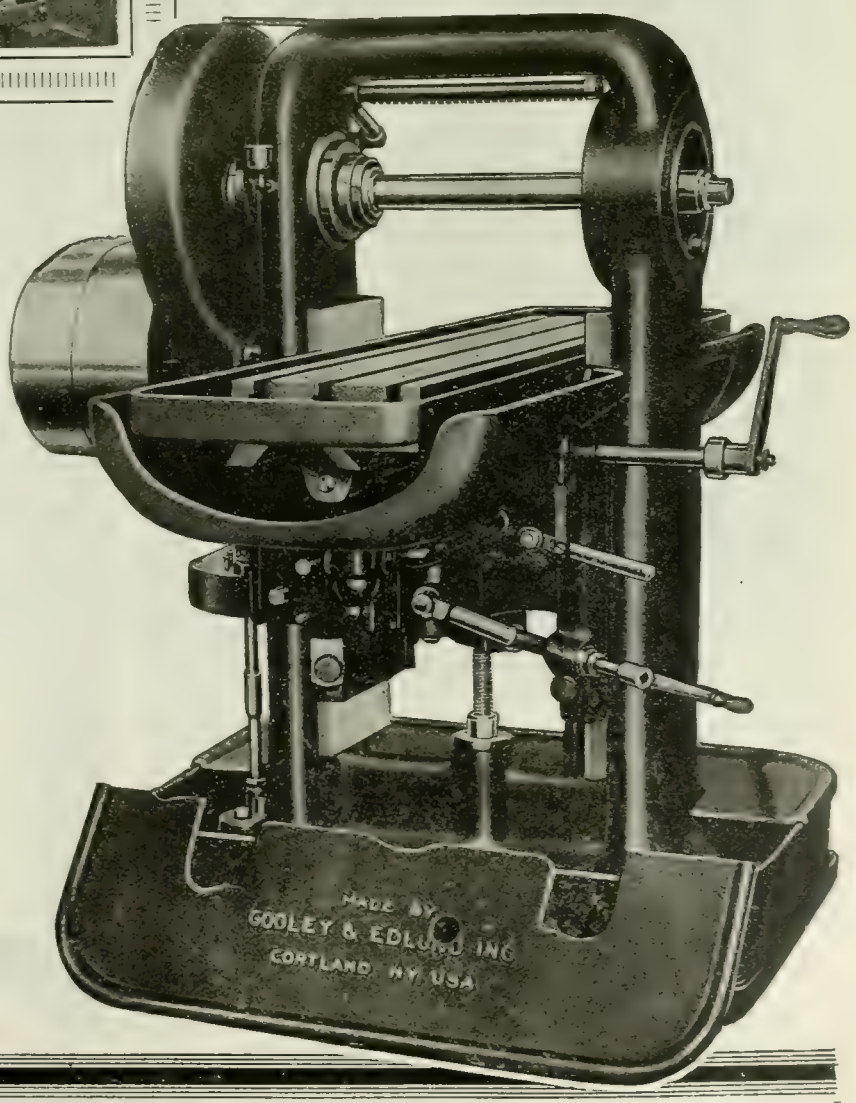
HYDE PARK, BOSTON, MASS.

TORONTO: A. R. Williams Machinery Company, Ltd., 64 Front Street West
MONTREAL: Rudel-Belnap Machinery Company, Ltd., 137 McGill Street

BRIGGS MILLER

Keeps Five Die Sinkers Going





HERE you see the Briggs Miller Squaring Die Blocks, and it is working so fast it keeps five die sinkers going.

Some are new, squared from the rough; some are old, annealed, cut down and made over; some are oblong, some square, in sizes up to 9 inches. This Briggs Miller has been squaring blocks for four years; has never given any trouble. When cutters get dull the operator has another gang ready to go on with the work. Unusual rigidity accounts for Briggs' higher efficiency.

Don't you think you could use this tool to advantage in your shop? Write for the details.

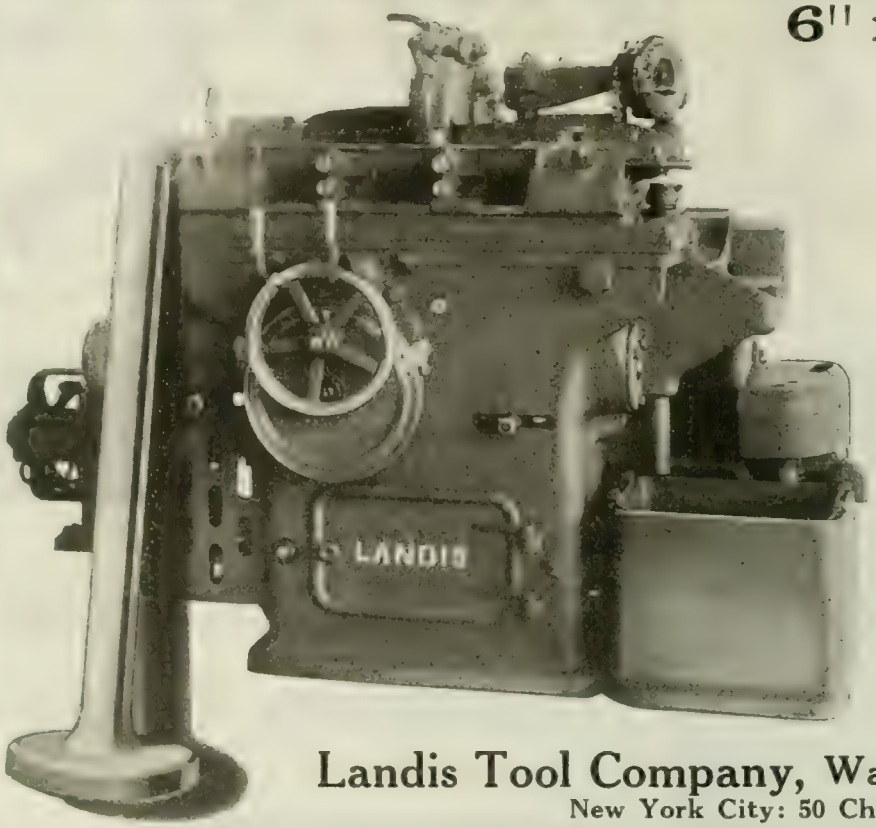
Gooley & Edlund, Inc.

Cortland, N.Y., U.S.A.

Garlock Walker Machinery Co., Ltd.
Toronto, Ont.

Williams & Wilson, Ltd., Montreal

140 Valve Stems per Hour on the "LANDIS" 6" x 18" Grinding Machine



ONE enthusiastic user calls this tool "the biggest little machine on the market." It is a great little producer, compact, sturdy and accurate.

The stems of these valves require finishing within .00025" limits. The Landis does this easily, using a 4-inch face wheel requiring a traverse of only 3/8" to cover the stem and at a speed of 140 valve stems per hour.

Landis Tool Company, Waynesboro, Pennsylvania
New York City: 50 Church Street

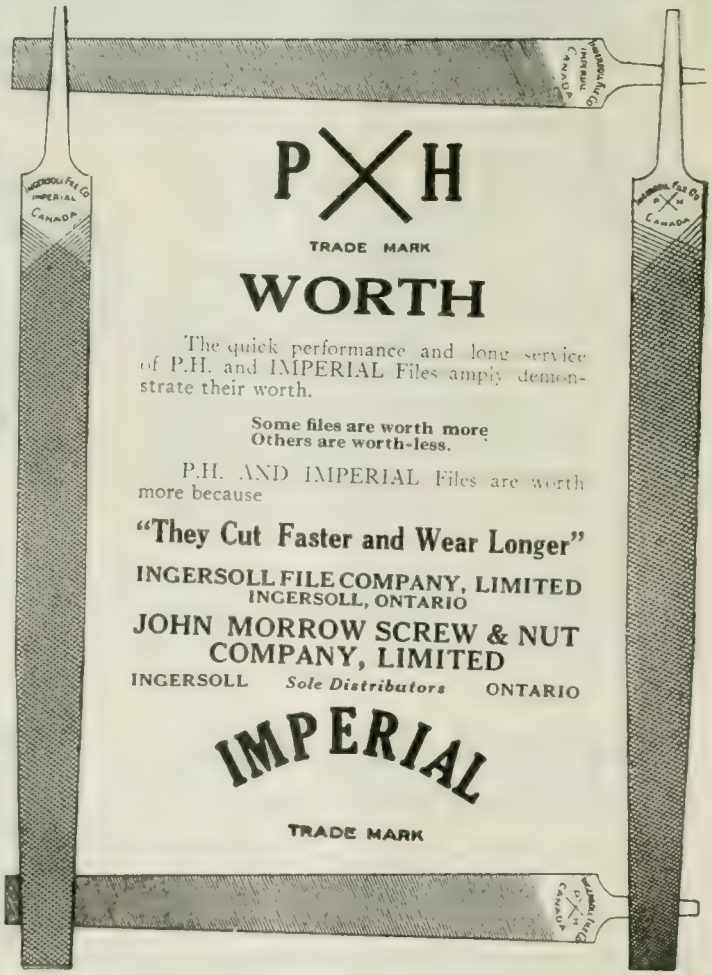
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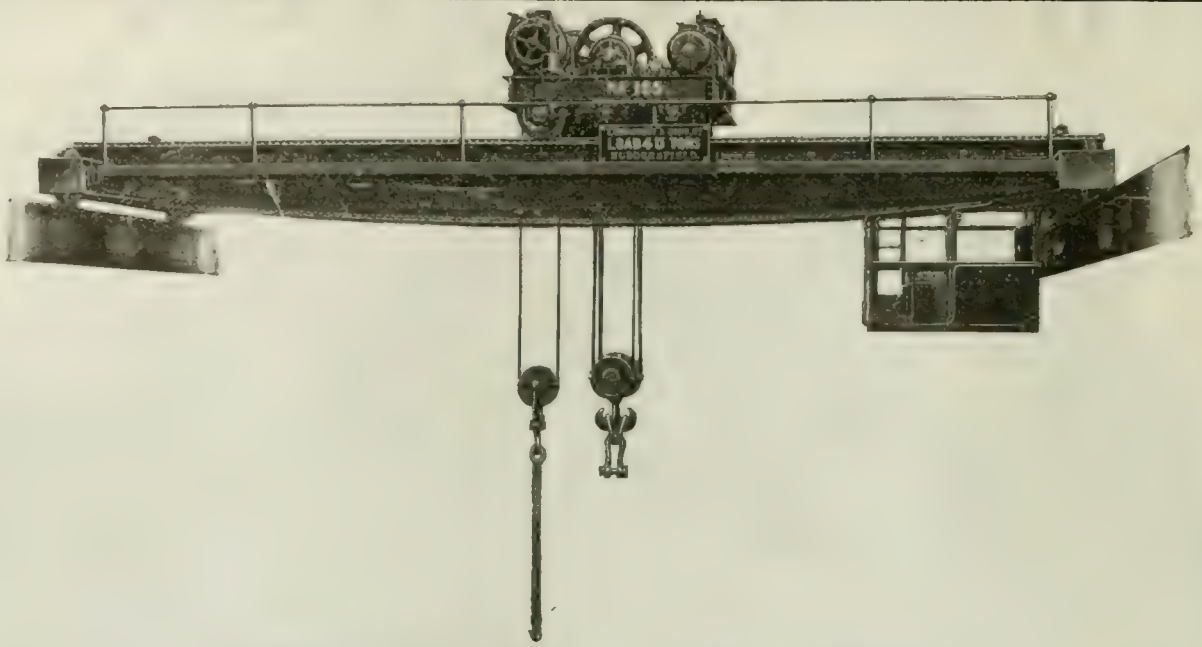
May we send you Descriptive Bulletins?

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GRAND RAPIDS MICHIGAN, U.S.A.

European Offices: Manchester, England; Paris, France.

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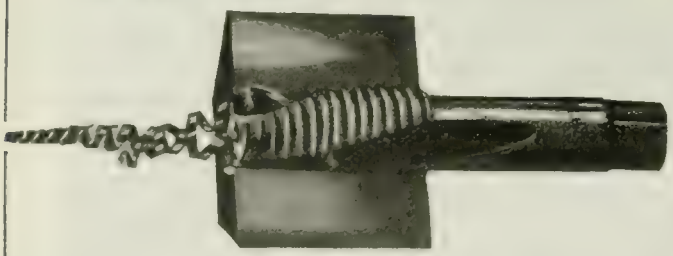


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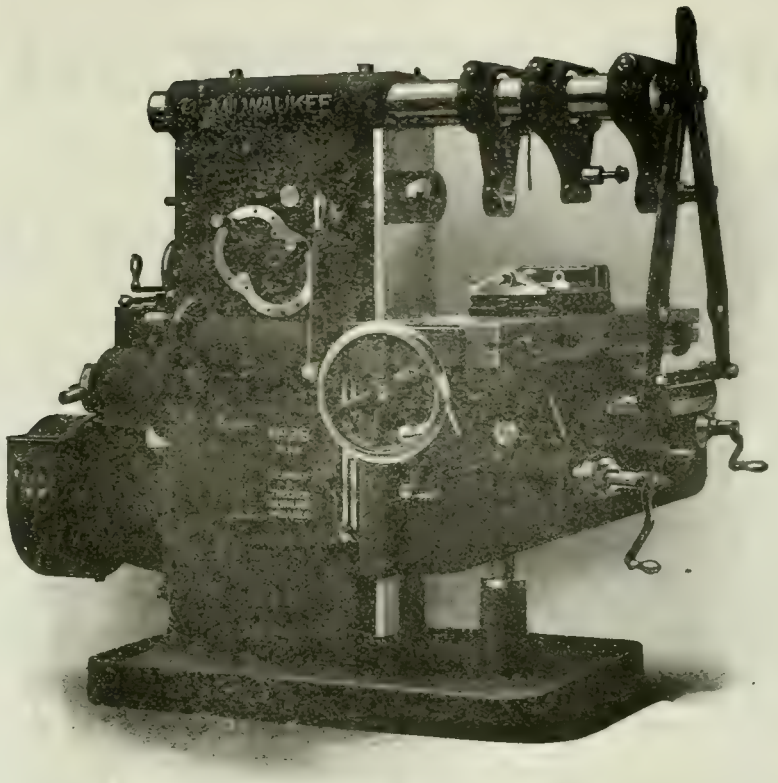
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MILWAUKEE MILLING MACHINES

Double Overarm maintains alignment.

It is impossible for the operator to place the arbor supports on the arbor and double overarm in any other way than in line. Arbor cannot be pounded out of line when using large, coarse pitch cutters on rough, heavy work.

Other Distinctive Milwaukee Features:

Solid top knee—hardened steel gearing and shafts in the column and feed box—automatic flooded lubrication — one and one-half gallons of oil per minute pouring over all gears and bearings in the column and feed box, insuring lubrication at all times—flanged spindle with hardened steel collar for driving arbors—constant speed drive, reverse being self-contained.

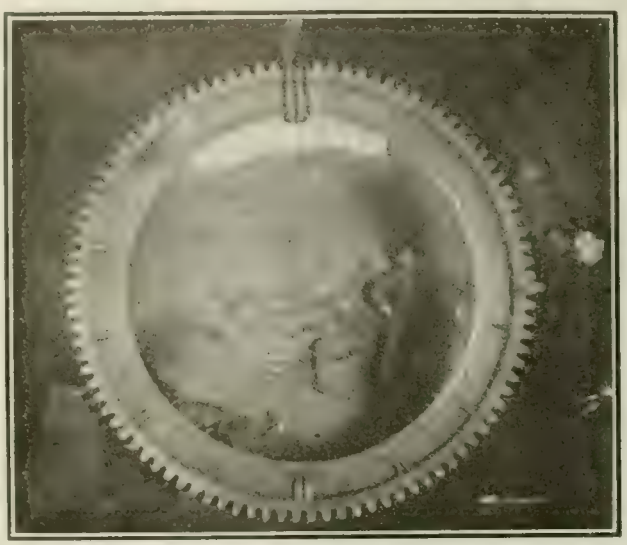
Send for our No. 21 Catalogue. Illustrating and describing Milwaukee Milling Machines and accessories in detail

KEARNEY & TRECKER CO.

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In Canadian Industry



Machine Moulded Gears. any size up to 18 ft. diameter. No patterns needed.

The development in manufacturing, in mining, in railroading, in shipping demands dependable equipment.

There is not an industry in Canada to-day where the quality represented by **"HISCO"** Steel Castings is not an absolute essential.

"HISCO" Steel castings have been demanded for special purposes in pulp and paper mills, in textile mills, cement mills, in mining enterprises, in locomotive and car construction, in enterprises big and little.

"HISCO" will be found wherever reliable service is required.

HULL IRON & STEEL FOUNDRIES, LTD.

HULL, CANADA 2



"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.

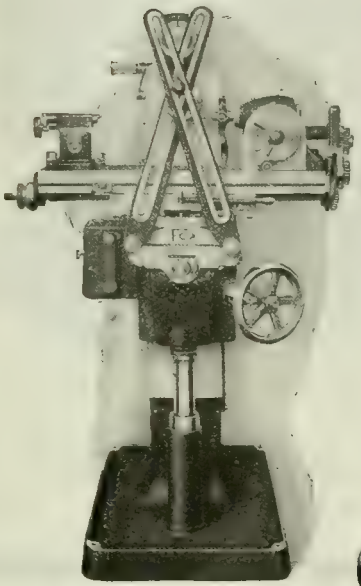
Marshalltown, Iowa
U. S. A.

TRADE FOX MARK
REGISTERED

MILLING MACHINES

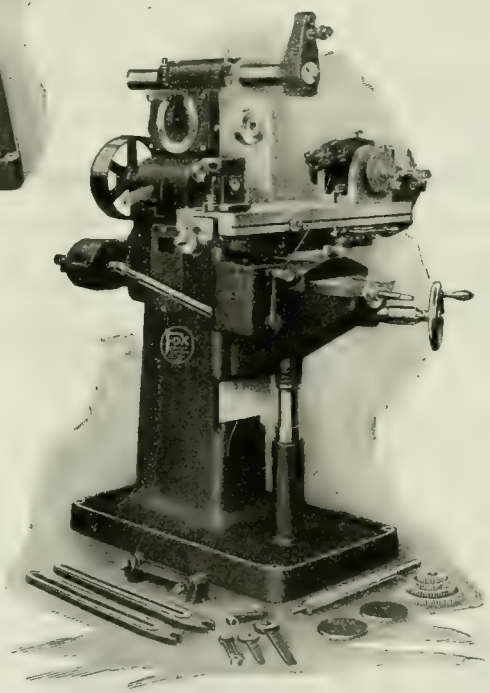
FOR

Rapid Production of Motor Parts



The **demand** for increased production **requires tools** of **great strength** and **durability**; the Fox 2-A Universal Milling Machine illustrated has met this demand, and is being used wherever extreme accuracy and quantity production are required.

The machine has a universal table, spiral cutting attachment, 10″ Dividing Head with 6″ Universal Chuck, making it a machine **especially adapted for Tool Room Work.**



The **United States Government** used this machine in its various **repair shops** for **Aeroplane Motors.**

You should be using this tool to help the production of parts necessary for reconstruction.

Specifications—No. 2-A Miller.

Spindle speeds 12
From 21 to 423 r.p.m.

Table feeds 6
From .317″ to 2.79″ per min.

Table 8½ x 27″
Long. feed (power) 26″.
Vertical feed (hand) 13″.
Trans. feed (hand) 8½″.

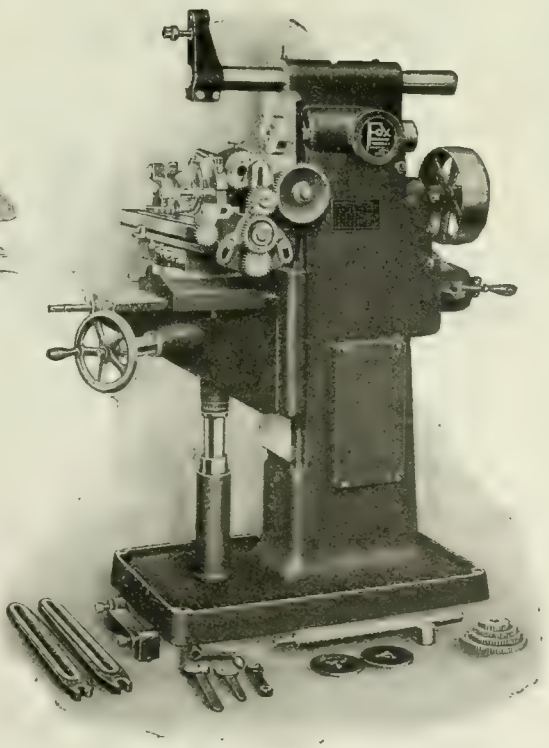
Drive...Single pulley 10 x 3″ running 250 r.p.m.

Gears — Hardened steel.
Weight 1,500 lbs.

We build this same machine with a plain table, omitting the spiral cutting attachment and Dividing Head.

Our No. 1 type machine has a four-step cone drive, and while being a lighter machine is a "bear" for work. This was proven by **the hundreds** of **them in the largest munitions plants.**

We also build the Fox Multiple Spindle Drilling Machines.



FOX MACHINE COMPANY

1047 W. Ganson St., Jackson, Michigan, U.S.A.

Wherever Pipe is Cut or Threaded Economically

The probability is two to one that it's a

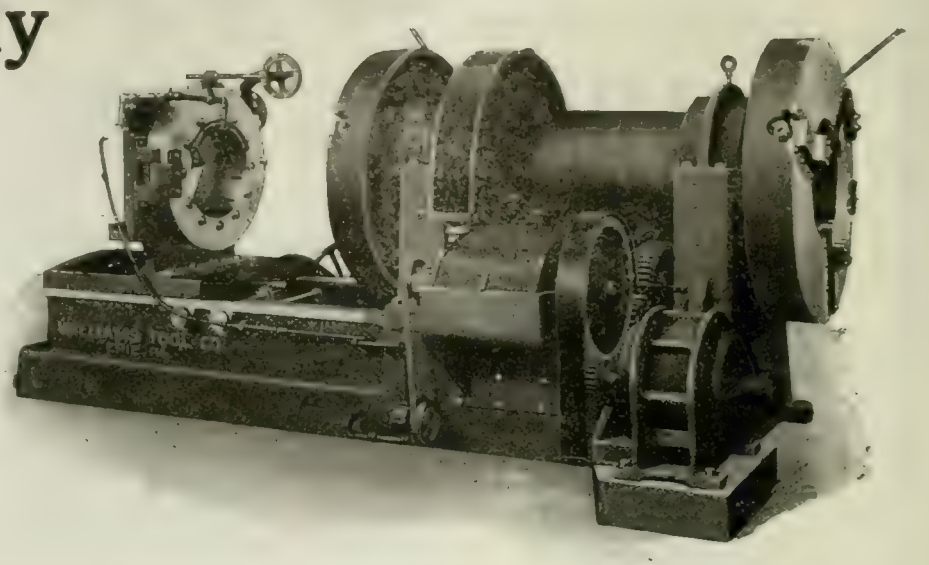
Williams Pipe Machine

that's on the job.

For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.

It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.

The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.



Write

Williams Tool Company

Erie - Penn. - U.S.A.

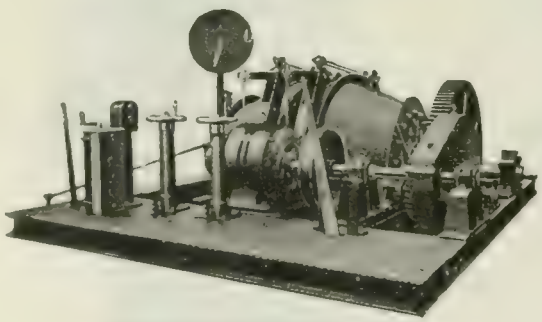
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Clothing Protection as Necessary as Machine Guards

PROTEXAL CLOTHING



is safe and comfortable. Extra patented fasteners at wrists and ankles permit garments being more tightly fastened and safeguard the wearer from being caught in machinery; this feature alone helped make Protexal clothing popular.

No Clothing like it Marketed

Made of high-grade, closely woven, especially treated duck material to **resist fire, water or acid**; will outwear overall or other work-cloth.

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ADJUSTOGLAS PROTECTION GOGGLES

for chippers, grinders and welders.

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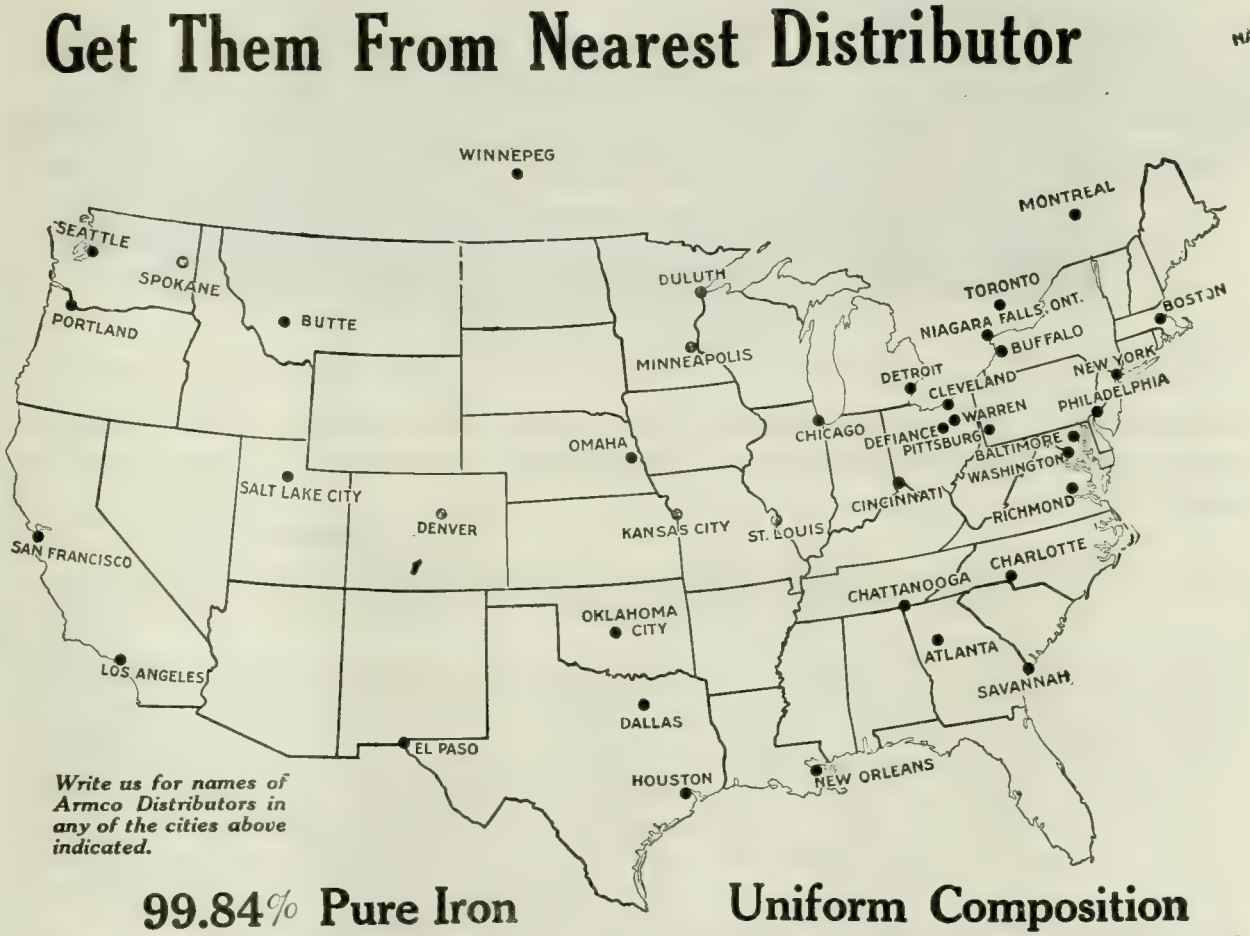
ARMCO IRON WELDING RODS

are steadily increasing in popularity, especially among welders who are building up a reputation for quality of work and reliability. Each new ARMCO enthusiast passes on the word that this strictly American product surpasses in purity and uniformity even the best grades of Norway and Swedish iron. The result is a rapidly growing insistence for ARMCO and our response with the coast-to-coast distribution shown below.

AMERICAN ARMCO INGOT IRON

The trade mark ARMCO carries the assurance that iron bearing that mark is manufactured by the American Rolling Mill Company with the skill, intelligence and fidelity associated with its products, and hence can be depended upon to possess in the highest degree the merit claimed for it.

Get Them From Nearest Distributor



Write us for names of Armco Distributors in any of the cities above indicated.

99.84% Pure Iron

ARMCO IRON Welding Rods have a guaranteed analysis of 99.84 per cent pure iron content (minimum)—a practical purity which insures complete and uniform cohesion and maximum strength of the welded section. Such purity also makes it possible for two kinds of rods of guaranteed ARMCO analysis, one specially treated for electric and the other for oxy-acetylene, to do all the work (and better work) that heretofore has required a wide range of filler compositions.

Uniform Composition

The uniform composition of ARMCO IRON Welding Rods, as determined before drawing by microscopic and chemical analysis of samples from various parts of split ingots, is another assurance of tough welds that will endure the most severe service and reflect credit upon the welder. This uniformity also insures free flowing of the welding material and a joint that can be hammered, forged, and, when necessary, annealed and quenched. Operators produce their best work when they use ARMCO Rods.

Send for our booklet on Armco Iron Welding Rods. It is full of interesting and useful data.

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Established 1883 as Page Woven Wire Fence Co.

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Makers of "Copperweld" Copper Clad Steel Wire; ARMCO Iron Welding Rods and Electrical Wire; Wire Mill Products, Plain and Galvanized; Wire of Special Analysis; Wire Fencing for all Purposes; Factory Gates; Ornamental Iron Fence; Machine Guards; Tool and Stock Room Partitions; Architectural Iron.

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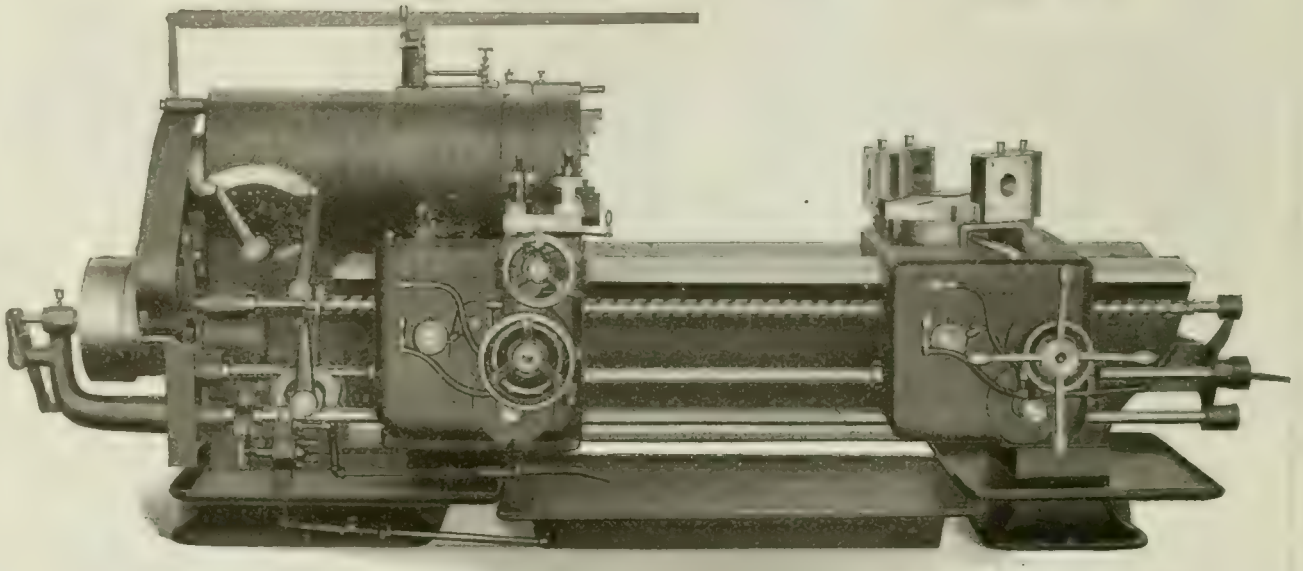
SAN FRANCISCO: American Rolling Mill Company of California

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STEEL AND WIRE PAGE QUALITY PRODUCTS

43

STEINLE



Still another reason why the Steinle 24" Full Swing Side Carriage Turret Lathe is ahead of all others in the economical and accurate production of many classes of work.

THE SIDE CARRIAGE

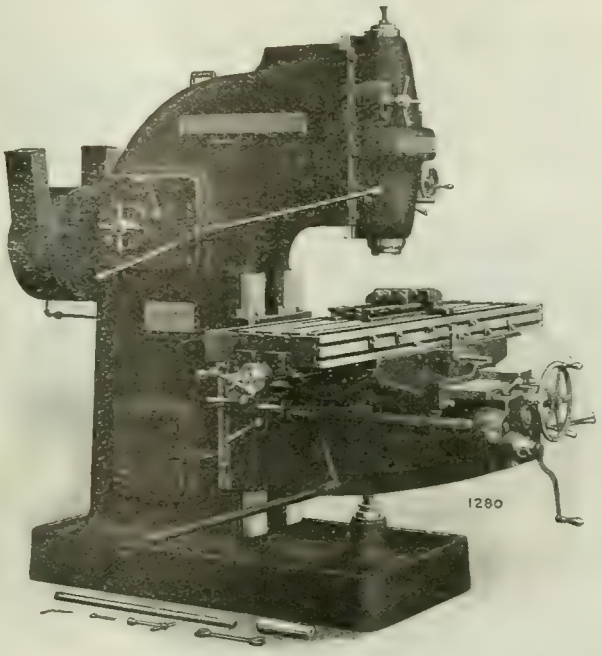
This feature has many advantages over the old style carriage that spans or bridges the ways. It is designed in such a manner that while it can be run past the chuck and permits bringing the turret up close to the work there is no sacrifice of strength or rigidity due to the absence of a bridge across the ways. The side carriage is firmly supported by the massive front way at the top of the bed and secured with a dove-tail gib to a way located at the bottom of the front of the bed. It is thoroughly substantial in design and is equipped with a cross slide having power cross feed, on the top of which slide is mounted a turret block carrying four tool holders. It has power traverse, quick change longitudinal feed, and power cross feed all of which are reversible and controlled from the apron. While this carriage does not span the ways it is so substantially supported that it can be used for most severe service in facing to the centre and similar work such as cutting off heavy bar stock.

All of the advantages of this side carriage feature are not available except where the design of the entire machine has been carried out with a view of utilizing them and in a future issue of this Journal we will describe another feature, the design of which as incorporated in this machine permits of the use of all side carriage advantages.

STEINLE TURRET MACHINE CO.

MADISON - - WISCONSIN, U.S.A.

The New Cincinnati No. 4 High Power Vertical



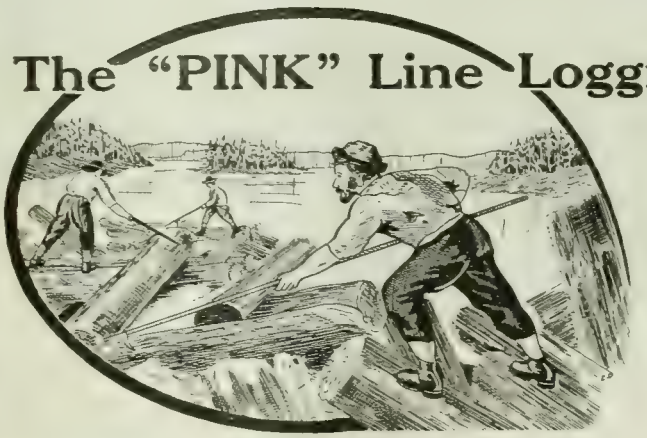
- Intermittent feed, power quick traverse
- Square gibbing with narrow guides
- Feed changes at front of knee
- Safety couplings in feed transmissions
- Individual feed control levers
- Automatic lubrication
- Centralized oiling
- Stream lubrication
- Hardened sliding gears throughout
- Starting lever at front
- Automatic brake
- Cincinnati standard flanged spindle end
- Spindle can run in either direction

Patent Rights Fully Reserved

THE CINCINNATI MILLING MACHINE COMPANY

CINCINNATI, OHIO

The "PINK" Line Logging Tools and Handles



MADE-IN-CANADA Products---Headquarters for British Empire for all Lumbering Tools

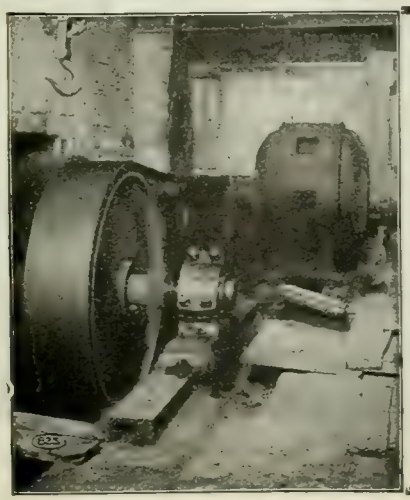
In every lumber camp in Canada you'll find PINK'S famous lumbering tools. They are the favorites there and have won the esteem of all woodsmen through their superior merit. They are world-renowned and are extensively used in Australia, New Zealand and other countries where the lumbering industry thrives.

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We export the same good quality of lumbering tools that have made PINK'S TOOLS a by-word in the matter of good tools in all Canadian lumber camps. Enquiries cordially solicited.

Thomas Pink Co., Limited

PEMBROKE, ONT., CANADA



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"RENOLD" "MORSE"

Efficient - Powerful - Compact

¼ h.p. - 5000 h.p. Drives

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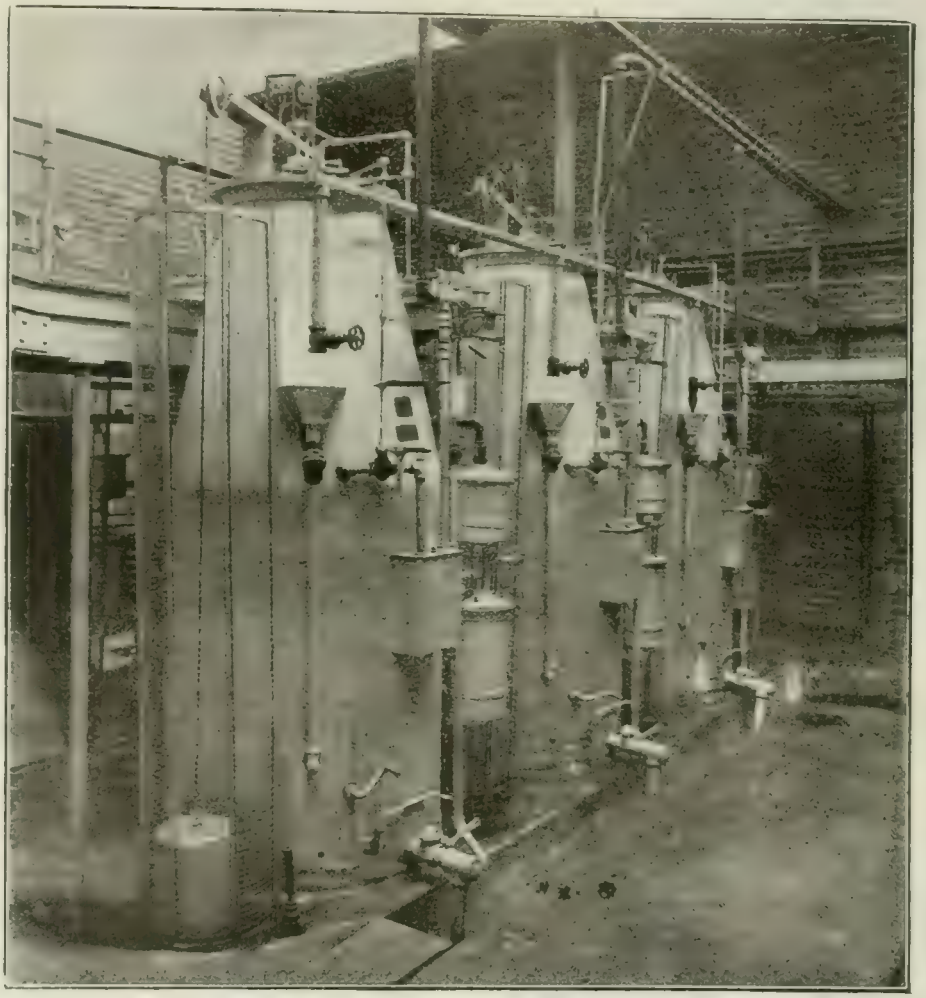
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TORONTO

Acetylene For Welding And Cutting

Acetylene is the only efficient gas employed for both cutting and welding of metals. For shop operations and for yard use, with fixed stations, the most economical and satisfactory supply is by generation of acetylene on the premises as it is required, piping the gas under working pressure directly to where it is wanted, avoiding transportation delays, costs, and handling of acetylene tanks, and the necessarily higher cost of the gas. For outside work where portable apparatus is required, the portable acetylene tanks are invaluable.



This illustration shows a bank of three 300-lb. carbide capacity Davis-Bournonville acetylene pressure generators, which is one section of a twelve-generator installation in a metal working plant.

Davis-Bournonville generators are made in several sizes and are frequently installed in batteries of from two to twelve of the largest size. Automatic in operation, and with no additional storage of free acetylene, they provide the highest efficiency in acetylene production. Davis-Bournonville apparatus comprises the widest range of equipment for the production, distribution and application of acetylene, oxygen and hydrogen for welding and cutting.

DAVIS-BOURNONVILLE COMPANY

Sales Rooms at: 168 King St., W., Toronto; 44 Craig St., W., Montreal.

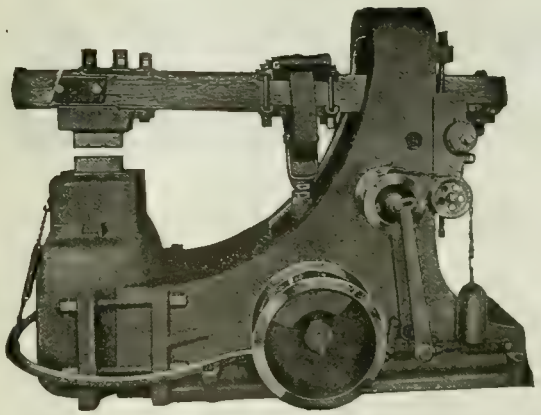
Factory at Niagara Falls, Ontario

Atlanta
Boston
Buffalo
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WELDING AND CUTTING
DAVIS
APPARATUS
DAVIS-BOURNONVILLE CO.
"MADE IN CANADA"

Los Angeles
Minneapolis
Montreal
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We'll Help You to Blaze a Trail of Efficiency



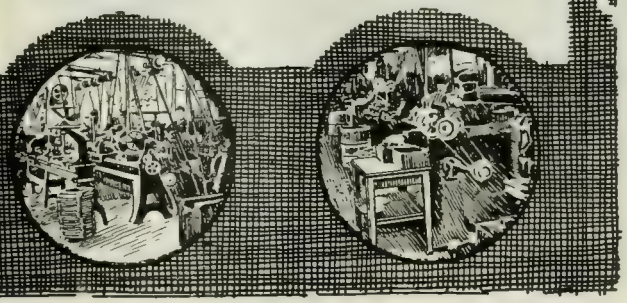
The Rochester Helve Hammer

The Mechanic who works comfortably does the best work in quick time. He gives you WORTH-WHILE results. You can't pry him loose from a superior tool. He brags about it. Give the chap a chance who uses the Helve Hammer. In 9 cases out of 10 he'll say, "The Rochester Helve" for mine. He is the man who knows the 100% Satisfaction Helve. We can't tell you all its distinctive features in this brief advertisement, so we ask you to write for our Helve Hammer Book.

THE WEST TIRE SETTER CO.
ROCHESTER, N.Y., U.S.A.

SPECIAL TOOLS

Automatic Machinery
for all purposes
Punch Press Work
Screw Machine Products
Consult us on your machine problems
Toronto Tool Company
516 Richmond St. West Phone Adel. 1181





Your Money's Worth

Never again will the Canadian Nation and People be the same careless improvident spenders of "ante bellum" days. "EFFICIENCY" and "GET YOUR MONEY'S WORTH" will be the popular motto and the successful machine shop manager must be able to see the advantage of making one pound of High Speed Tool Steel do the same work as ten pounds in forged tools; in other words he must and will

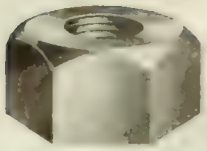
USE ARMSTRONG TOOL HOLDERS

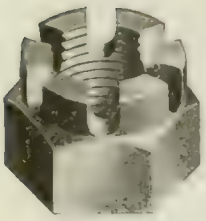
No heavy "stub-ends" to throw away. No time lost with men at the grinder while lathes stand idle. No stock of heavy sizes of steel to carry, and the blacksmith as a tool-dresser is eliminated entirely.

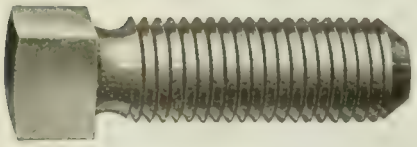
Armstrong Tools are great favorites with the men—a good thing to consider from a production standpoint.

Our Catalogue is of handy pocket size and will be mailed to you upon request

ARMSTRONG BROS. TOOL CO.
"THE TOOL HOLDER PEOPLE"
306 N. FRANCISCO AVE. CHICAGO U.S.A.









Screw Machine PRODUCTS

Standards in Stock

NUTS

Plain and Castellated—S.A.E.—Semi-Finished—V.—U.S.S.

SCREWS

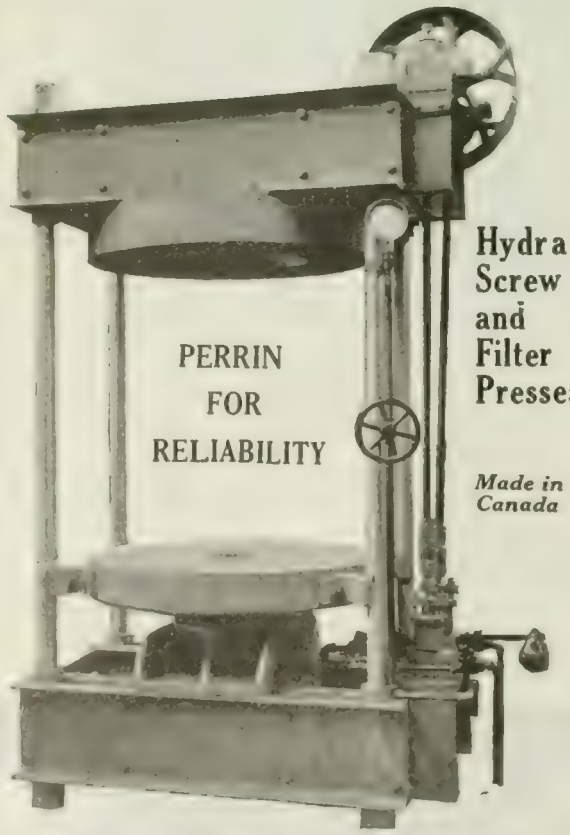
Cap—V.—U.S.S.—S.A.E.—Set—U.S.S.—V.

Special Parts

Made to customers' specifications. Sizes up to 2¼ in. diameter, 10½ in. long.

THE NATIONAL ACME COMPANY

De Courcelles and G.T.R. MONTREAL, P.Q.



Hydraulic Screw and Filter Presses

Made in Canada

Hydraulic Truck Tire Press

WILLIAM PERRIN LIMITED

TORONTO

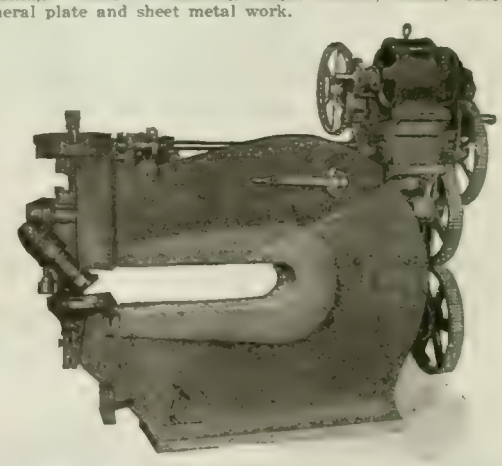
"QUICKWORK"

Registered in U.S. and Foreign Countries.

ROTARY SHEARS

MADE IN 7 SIZES.

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

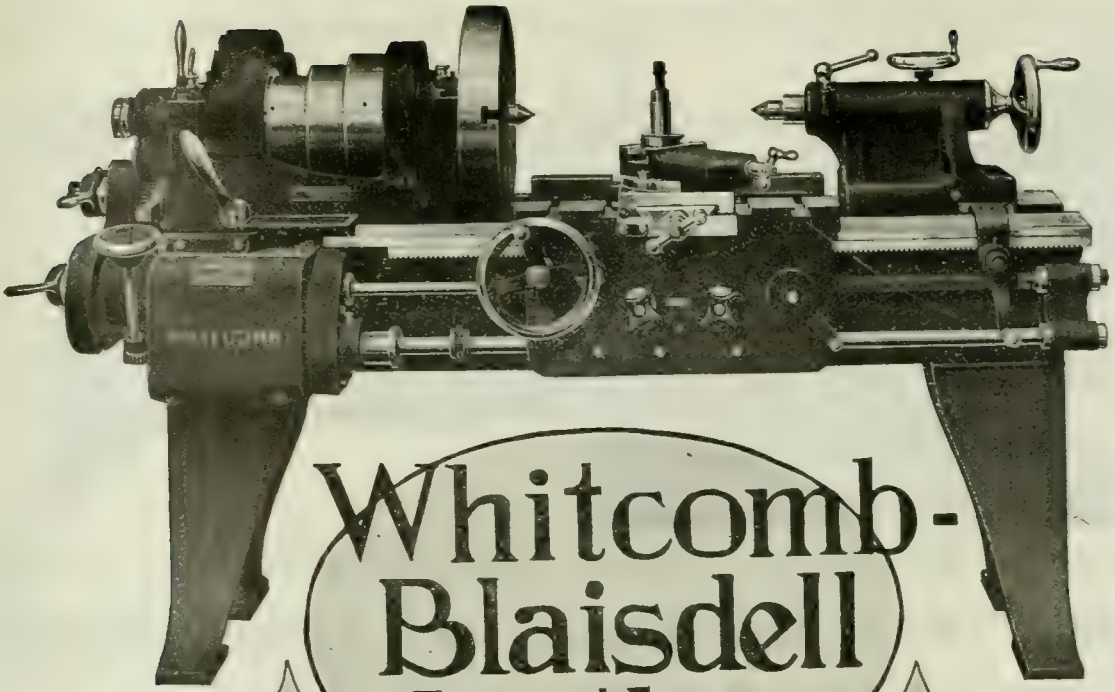
SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing.

Write for Catalogue No. 60.

THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

Cable address: "QUICKWORK."
Codes: W. U. and General.



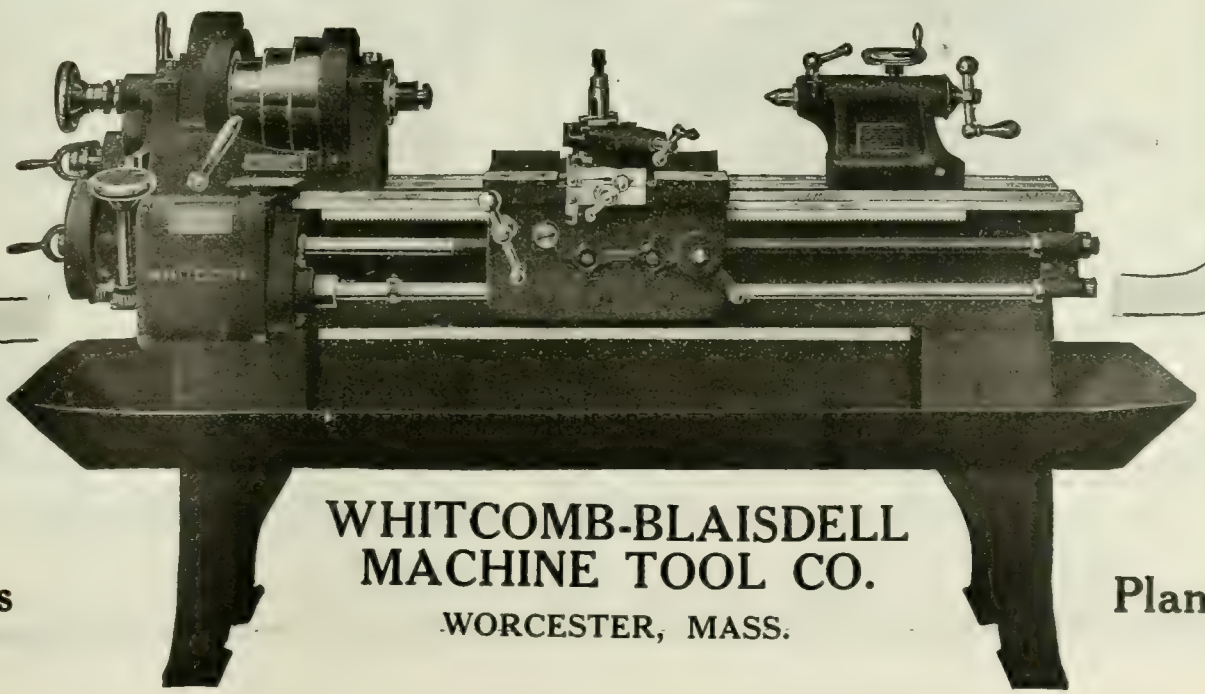
Whitcomb-Blaisdell Lathes

POWERFUL, WELL-BALANCED MACHINES THAT ARE LIGHT-RUNNING AND ADAPTED TO ALL CLASSES OF **RAPID MANUFACTURING.**

Every feature of the W-B Lathe of to-day has been considered from the viewpoint of greatest utility. Materials used embody toughness and durability. Our tests must prove great wearing quality and strength before any material is selected.

The product of an organization that has for sixty years been distinguished for the superior design, workmanship and material of its product.

Write for our latest catalog describing all of the good features of Whitcomb-Blaisdell Lathes

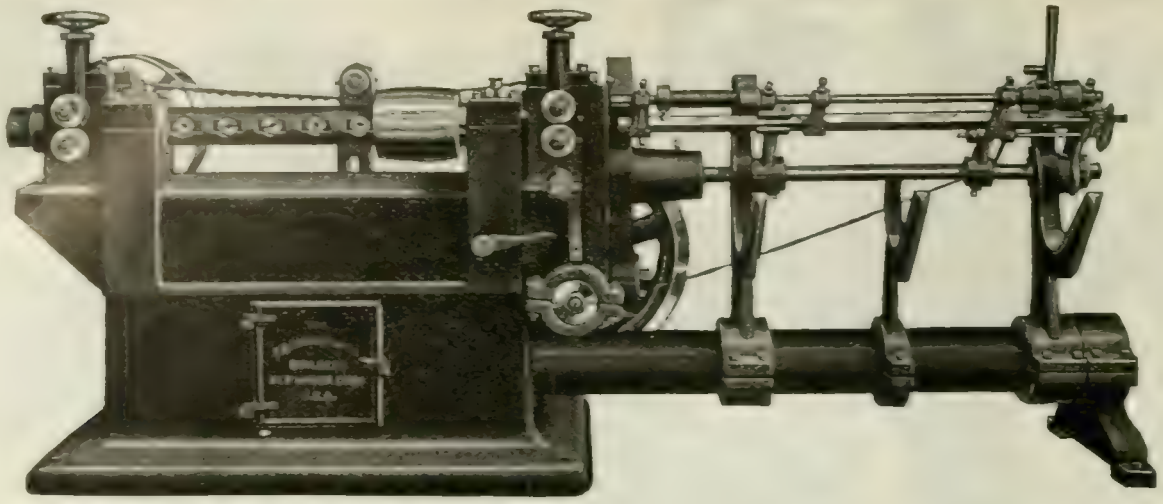


Lathes

WHITCOMB-BLAISDELL MACHINE TOOL CO.

WORCESTER, MASS.

Planers



Perfect Wire Straightening Quickly and Profitably Done on Our

Automatic Wire Straightening and Cutting Machine

Just put your coil of wire on the reel, adjust the rolls and dies, and set the gauge for the length you want. The machine does the rest—thousands of feet per day, perfectly straight and cut to accurate lengths.

Catalogue tells more about them, and we will be glad to send you a copy.

THE F. B. SHUSTER CO., New Haven, Conn.

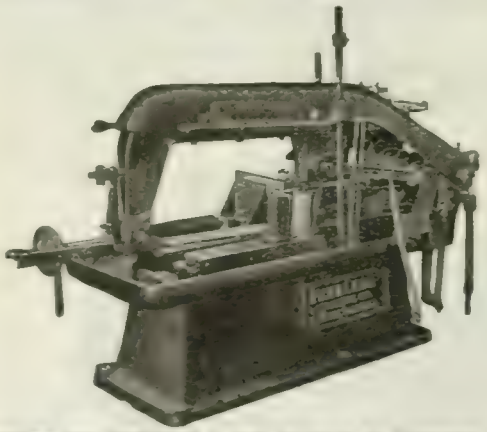
FORMERLY JOHN ADT & SON ESTABLISHED 1886

ALSO MAKERS OF STRAIGHTENERS FOR SQUARES, HEXAGONS, FLATS, ETC.

Would you like to have us prove that

Peerless HIGH SPEED

Machines do 50 to 100% more work



The Peerless has established a new standard of production in so many plants that we are glad to ship one at our expense and risk. If you agree to give it a thorough test. A trial like this often results in our selling from 1 to 10 machines.

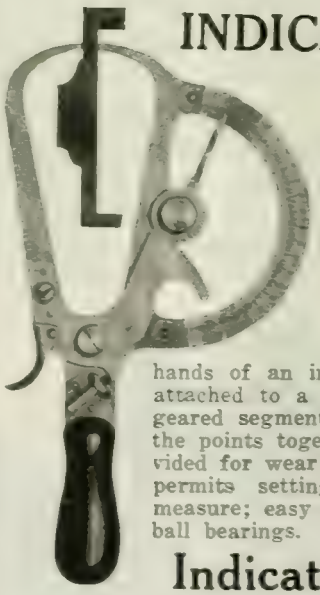
The Balance Lift of the Peerless

automatically moves the blade for the return stroke. This greatly prolongs the life of the blade, conserves power, and increases productivity. There are many other features which we shall be glad to enumerate for you.

The Peerless assures you the peak of production at very lowest cost. Write for full details.

PEERLESS MACHINE CO.

1607 RACINE STREET RACINE, WISCONSIN



INDICATING CALIPERS

This finely made tool, of the simplest construction, incorporating features of outside calipers, rule, magnifier, and indicator, is accurate, easily read and manipulated with one hand. Great saving of time is effected in the hands of an interested user. A hand attached to a pinion is actuated by a geared segment; a coiled spring draws the points together; adjustment is provided for wear of parts; locking device permits setting of tool to required measure; easy movement is effected by ball bearings.

Indicating Calipers

are used by

MACHINISTS, PATTERN, TOOL and MODEL MAKERS.

$8.75 **3"** Graduated in 64th inches. Scale enlarges two times. **2"** Graduated in 100ths inches. Scale enlarges three times.

Write for folder or make inquiries thru local dealer.

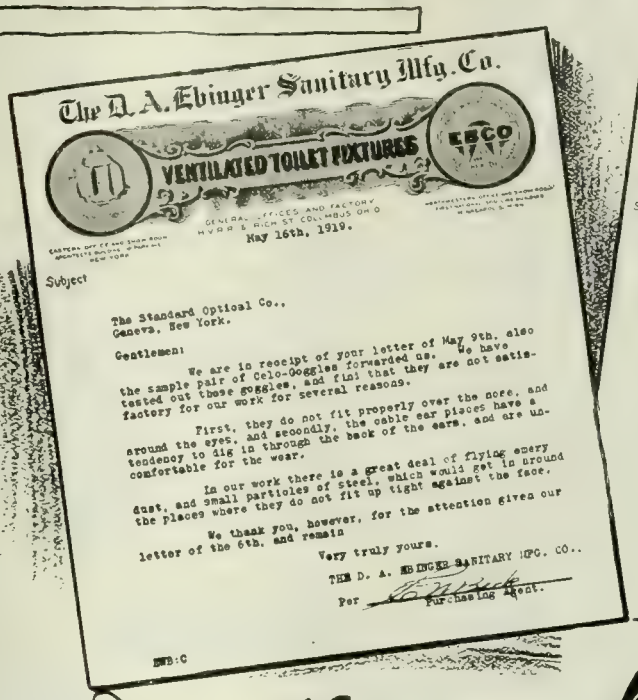
MADE EXCLUSIVELY BY THE

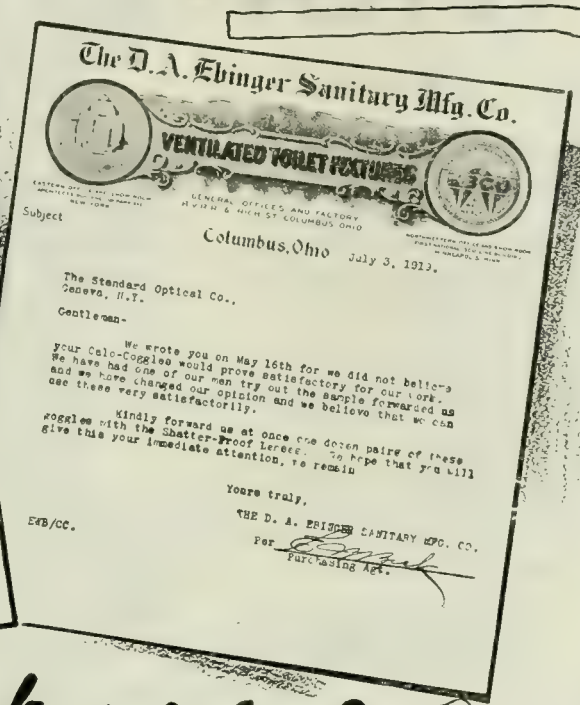
INDICATING CALIPERS CO.

506 East 19th St., New York

Stocked by Exclusive Canadian Agents:
Williams & Wilson Limited, 84 Inspector Street, Montreal, Que.

BEFORE AFTER

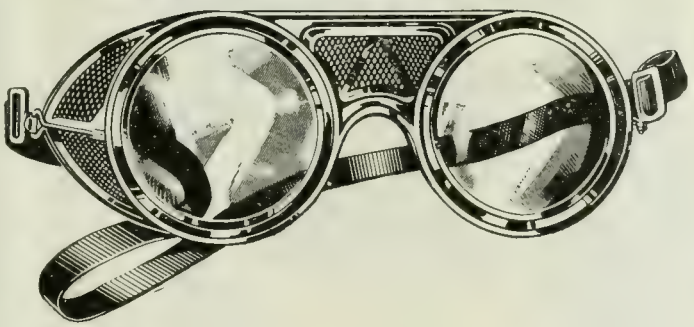

The D. A. Ebinger Sanitary Mfg. Co.
VENTILATED TOILET FIXTURES
EBCO
GENERAL OFFICES AND FACTORY
HYGIA & HIGH ST COLUMBUS OHIO
May 16th, 1919.
Subject
The Standard Optical Co.,
Geneva, New York.
Gentlemen:
We are in receipt of your letter of May 9th, also the sample pair of Celo-Goggles forwarded us. We have tested out these goggles, and find that they are not satisfactory for our work for several reasons.
First, they do not fit properly over the nose, and around the eyes, and secondly, the cable ear pieces have a tendency to dig in through the back of the ears, and are uncomfortable for the wear.
In our work there is a great deal of flying emery dust, and small particles of steel, which would get in around the places where they do not fit up tight against the face.
We thank you, however, for the attention given our letter of the 6th, and remain
Very truly yours.
THE D. A. EBINGER SANITARY MFG. CO.,
Per
Purchasing Agent.
EWB:C


The D. A. Ebinger Sanitary Mfg. Co.
VENTILATED TOILET FIXTURES
EBCO
GENERAL OFFICES AND FACTORY
HYGIA & HIGH ST COLUMBUS OHIO
Subject
Columbus, Ohio July 3, 1919.
The Standard Optical Co.,
Geneva, N.Y.
Gentlemen-
We wrote you on May 16th for we did not believe your Celo-Goggles would prove satisfactory for our work. We have had one of our men try out the sample forwarded us and we have changed our opinion and we believe that we can use these very satisfactorily.
Kindly forward us at once one dozen pairs of these goggles with the Shatter-Proof lenses. We hope that you will give this your immediate attention. We remain
Yours truly,
THE D. A. EBINGER SANITARY MFG. CO.
Per
Purchasing Agt.
EAB/CC.

a thorough trial of

STOCO SAFETY GOGGLES "CELOGLAS"

SHATTER-PROOF LENS



You try the STOCO Safety Goggle! Give it a **good** trial—don't be content just to look at it. Bend it; twist it; if the lens is a "Celoglas" break it with a hammer and try to force the pieces of glass out of the frame; put it on and see how comfortable it is; look at yourself in a mirror and see how it protects all the way around and **between** the eyes. Then put it in the shop and let the man who is to wear it O.K. it. He will.

Price of STOCO Safety Goggles with regular optical glass lenses (for protection against emery dust, etc.), $115.00 per hundred.

With "Celoglas" Shatter-Proof Lenses (for workers such as chippers who need extra-positive protection) $150.00 per hundred.

A sample of the STOCO Safety Goggle will be sent without charge to any Safety Engineer, Purchasing Agent or Superintendent on receipt of request on letterhead.

STANDARD OPTICAL CO.
GENEVA, N.Y.

TRANSVEYORS
Did It!

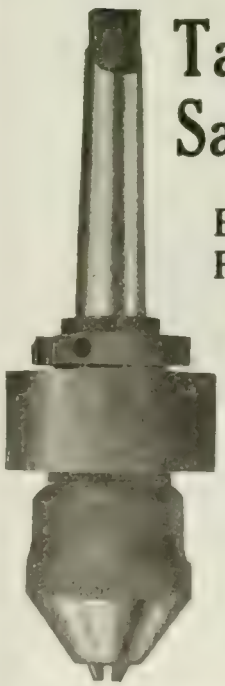
Castings by the hundreds — yes, by thousands — all easily, rapidly and efficiently transferable with the Transveyor.

Not on the floor, but on wooden platforms, or on skids made instantly mobile by elevating the Transveyor under the loaded skid—that is Transveyor transfer.

Despatching and storing material the Transveyor Way, promotes system, saves time and labor through the elimination of rehandling; reduces "overhead" cost.

Any business with a floor under it can beneficially apply Transveyors. Our latest machinery bulletin is yours for the asking. To what address shall we send it?

COWAN TRUCK COMPANY
15 Water Street, HOLYOKE, Mass.
Canadian Agent: R. B. SMILEY, 120 Glenholme Ave., Toronto, Ontario, Canada



Tap Chucks that Save Tap Costs

BICKNELL-THOMAS FRICTION CHUCKS

reduce tap breakage to the vanishing point. These chucks will hold the tap to the limit of its endurance, but a sudden strain sufficient to break the tap will cause the grip to loosen instantly. They are particularly adapted for tapping to the bottom of blind holes, for special work and—owing to their compact design—for use on multiple spindle machines.

Made in four sizes one-eighth to one inch. Straight or Morse taper shanks.

BICKNELL-THOMAS CO.
GREENFIELD, MASS., U.S.A.

Every Emery Wheel With Its Own Dresser



Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify "Diamo-Carbo"—the perfect diamond substitute.

For large, coarse, hard wheels ask for the "Desmond-Huntingdon."

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

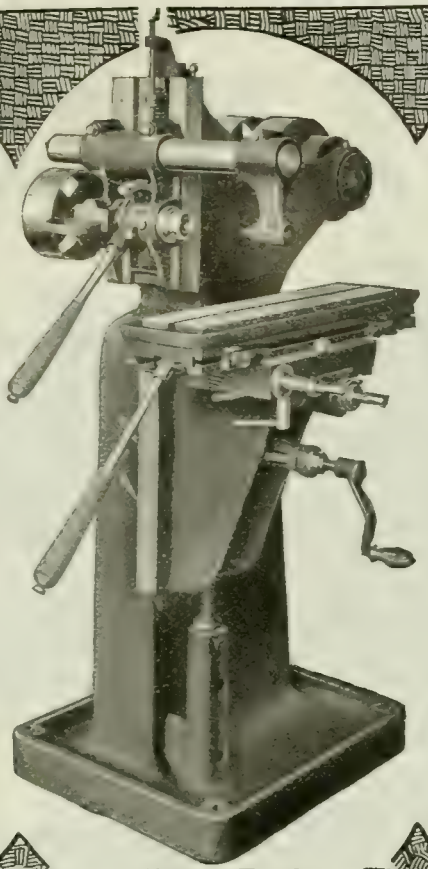
The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO
Alfred Herbert, Limited, Coventry, Agent for Great Britain

The "BRISTOL" Hand Milling Machine

Extensively used in the manufacture of small parts where accurate duplication is essential. Illustration shows our number 1 Heavy Type Hand Miller.

Specially designed for use on work where heavier machine than standard type is necessary.

BRISTOL



Convenience Assures Big Production

The lever controls make a very convenient method of operation, though crank is furnished for table feed for use when so desired.

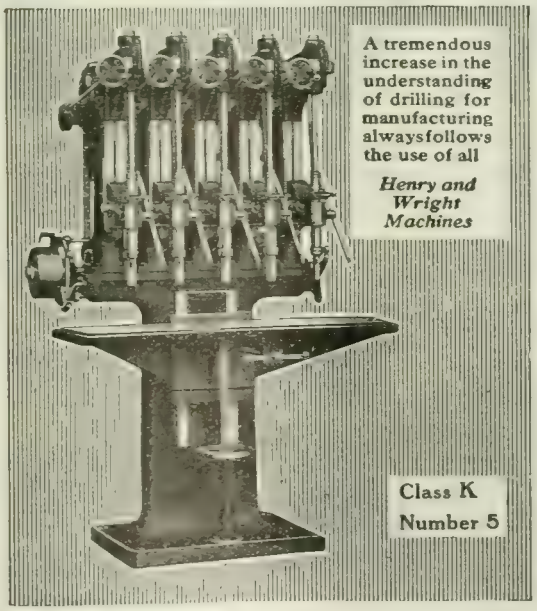
Users acknowledge these machines to be exceptional producers, proving in many cases more satisfactory than milling machines of the more expensive type.

Write for catalogue.

BRISTOL

The Bristol Machine Tool Co., Bristol, Connecticut

HENRY & WRIGHT
Drilling Machines



A tremendous increase in the understanding of drilling for manufacturing always follows the use of all *Henry and Wright Machines*

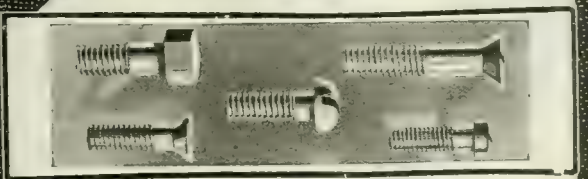
Class K
Number 5

The Henry & Wright Mfg. Co.
Hartford, Conn.

Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg; A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.

Wood Screw Making Machinery

SEND FOR CATALOGUE
Series B6



For sixty years we have constantly manufactured machinery for making screws, always studying to improve and refine our product.

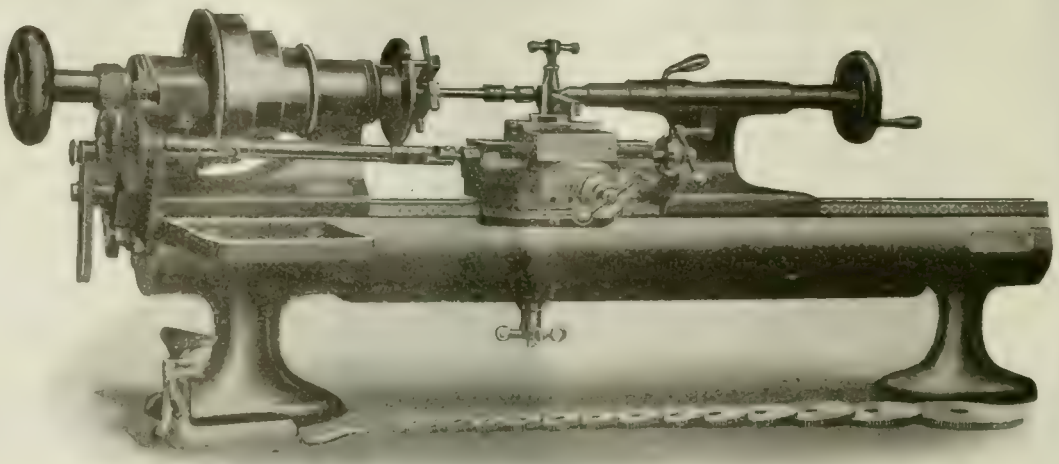
Write or Wire us.

Cable address: "Cook,"
Hartford, U.S.A.
Codes: Liebers
Western Union

Asa S. Cook Co.
Hartford, Conn.

CATARACT BENCH LATHES AND ATTACHMENTS

Cataract Bench Lathes are finely constructed precision tools, with responsive controls, simple adjustments and numerous convenient attachments adapting them to a wide variety of work. **Study this illustration.** Note the base, the circular bed, the sliding tool post, massive head stock (indicating strength), range of gears, special tailstock, arrangement of gears.



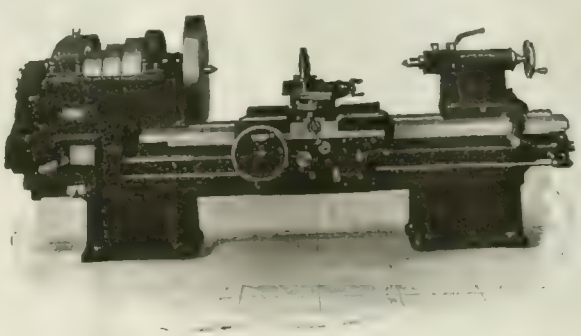
Hardinge Bros., 1770 Bertau Avenue, Chicago, Ill.

ALFRED HERBERT CO., Limited, Coventry, England, are our representatives for United Kingdom, France, Belgium, Russia, Japan, Manchuria, Korea, Formosa, China, Italy.

SIDNEY

Sidney for Service

Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.



Specifications include 3-step cone, double back gear, semi-quick change gear lathe, built on 10 ft. bed. This lathe also furnished with quick-change gears. Bed lengths available: 10, 12, 14, 16, 18 and 20 feet.

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 25-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool room work or the heaviest duty shipyard or factory rapid production work.

Heavy Duty Engine Lathes

The Sidney Tool Company, Sidney, Ohio

Canadian Agents: The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

Photographic Copying
The PHOTOSTAT
(Trade Mark Registered)

"Orders are now delivered three or four days earlier to our customers by making photographic copies of sketches and drawings which are the same in every detail instead of having our draftsmen reproduce the original.

"Practically all orders were previously held up three or four days by our drafting department while copies of the intricate drawings of ordered tools were being made. Now with the Photostat, only 15 or 20 minutes are required to make the three copies, exact duplicates of the original, which the factory needs to turn out the order. By eliminating this needless delay we are able to provide better service for our customers, and attract new prospects because of prompt deliveries."



This cut shows a PHOTOSTAT on which a large drawing has just been copied in less than a minute.

Never Makes a Mistake

It is simple, practical, easy to handle. Requires no expert knowledge. The machine is loaded with a roll of sensitized paper especially manufactured for the purpose.

The original subject is photographed directly upon this paper producing a facsimile copy which is immediately cut off, developed and fixed right in the PHOTOSTAT itself.

The focusing, exposing and developing are all controlled by simple mechanical devices and no glass plate, film or other intermediate negative has to be made.

After fixing, the copy is removed to a tank of running water and rapidly washed free from chemicals. It is then dried and is ready for use. As many copies as desired may be run off in this manner.

By a simple adjustment of the mechanical focusing device the copy may be made at actual size, reduced, or enlarged, within the size limitations of the machine.

Error in copy is impossible because every copy is an absolute facsimile. The operations are all simple, such as a boy or girl can do.

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Pencil Drawings, Ink Drawings,
Tracings, Reports
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Contracts, Ledger Pages,
Illustrations for Salesmen, Insurance Records,
Sketches, Blue Prints,
Specifications, Maps,
Legal Documents, Graphs,
Cuts and Drawings for Advertising, etc.

Manufactured by the Eastman Kodak Company exclusively for the

COMMERCIAL CAMERA COMPANY
343 STATE STREET, ROCHESTER, N. Y.

CHICAGO NEW YORK CITY PHILADELPHIA PROVIDENCE WASHINGTON

AGENCIES:

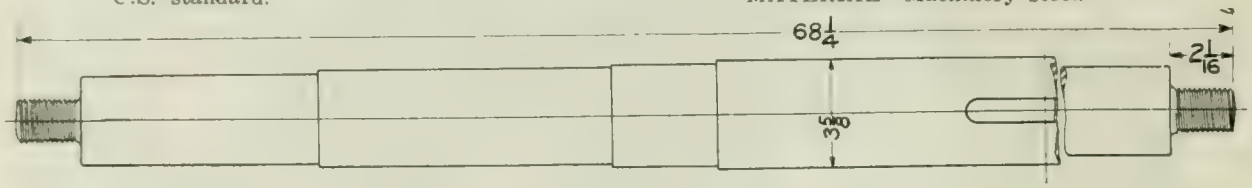
Alfred Herbert, Ltd., Coventry, England
Societe Anonyme Alfred Herbert, Paris, France
Societa Anonima Italiana Alfred Herbert, Milano, Italy
Graham Broters, Stockholm, Sweden

Smalley-General

THREAD MILLING MACHINES

Will give you a short cut to lower-cost thread milling.
Study the blue print and time study as given below.

MACHINE—Smalley-General Thread Miller No. 2.
THREAD—1½ in. diameter, 2 1-16 length, 6 pitch U.S. standard.
PIECE MILLED—Axle for tractor.
MILLING FEED—4.35 per minute.
MATERIAL—Machinery steel.



Tractor Axle Operation
TIME STUDY

5 minutes 37 seconds floor to floor milling both threads. Each thread milled in 65 seconds. Balance of time handling. Barker 3-jaw chuck used which had 12 in. unsupported overhang turn main spindle bearing to thread.

NOTE.—These parts were chucked through the rear end of main spindle. This was an awkward operation because the pieces were larger in the centre and the type of chuck would not let them through. A collet chuck with false collets would have permitted faster chucking.

Consult us on every phase of Thread Milling.

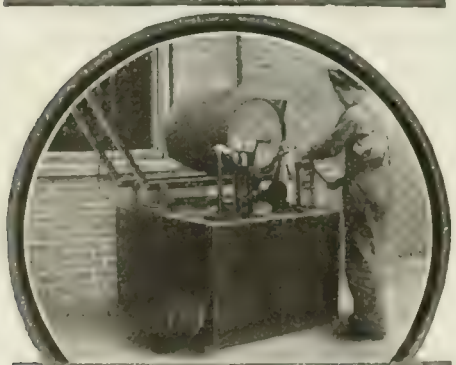
We will show you how to cut the costs.

Smalley - General Co., Inc., Bay City, Michigan

Canadian Agents: Rudel-Belnap Co., Ltd., Montreal and Toronto



Tiresome, Expensive, Dangerous, Wasteful—but Unnecessary.



With Bowser Equipment One Man Does the Work with Less Time and Effort —and Without Loss

STOP WASTING LABOR IN HANDLING OILS

Do away with the back-breaking, disagreeable labor in storing and handling oils.

With Bowser Storage Equipment the heavy work is done mechanically—there is no wasted energy—all oils are easily and quickly put into storage by gravity.

Save With BOWSER Systems

Distribution is done by accurate, rapid self-measuring pumps—no oils are left in shipping containers to dry up, leak and seep away—none is lost through spilling or dripping faucets. Every operation in the use of oils is done in a systematic, safe and saving manner.

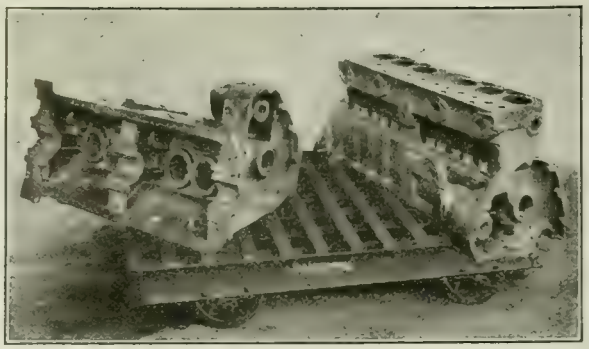
Write us for literature, showing why Bowser Systems are a paying investment

S. F. BOWSER CO., Limited

66-68 Frazer Avenue, Toronto, Ont.

LONDON 32 Victoria St. S. W. 1 | PARIS 5 Rue Denis-Poissons | HAVANA Lonja del Comercio 427 | SYDNEY 6 Castlereagh St.

How long would it take to clean this Cylinder by your present methods—and what would be the labor cost alone?



How long would it take to pay for a Sand-Blast Installation from the saving in labor cost if you cleaned it in 3 minutes?

CLEANED IN THREE MINUTES BY

PANGBORN SAND BLASTS

and whether your requirements are the cleaning of Castings, Forgings, Stampings, Sheet, Plate or Structural, or the removal of scale from Heat Treated Parts there's a Pangborn Unit or Combination for every need, large or small, that will make a saving for you — and a more attractive product.

PANGBORN CORPORATION
HAGERSTOWN, MD.
SAND-BLAST SPECIALISTS
P. O. 8503

Perfect Riveting

Provided its cost is the lowest possible, riveting so well done that it can't be improved upon, is perfect riveting.

Boys on Grant Riveters accomplish two and three times as much perfect riveting as an equal number of men using ordinary machines.

With the



GRANT
ROTARY
VIBRATING RIVETER

rivets placed close up to the shoulder of the work are as rapidly spun perfectly smooth as are rivets in easy-to-reach spots.

The Grant Mfg. and Machine Company
Holland Ave.
Bridgeport Conn.

Send for "Perfect Riveting"

Let them know it's there

In complimenting us upon the results secured from their advertisement in the classified section, one advertiser said:

> "Of course we would not have sold it without letting people know it was here, that is obvious, and thanks are due you for letting the people know it was for sale."

If you have any old or used equipment for sale, let people know it's there. Your message in Canadian Machinery will be placed before the probable buyers of such equipment.

Canadian Machinery
Classified Advertising Section
143 University Ave., TORONTO

Nichrome Castings for Heat Treatment



Cast "Nichrome" and Ferrous Materials at High Temperatures

There is an excessive reduction in the physical strength of ferrous materials after subjected to high temperatures.

In one set of experiments wrought iron had a tensile strength at 1700°F. of 6300 lbs. per square inch, less than 15% of its normal strength at 70°F. At 1700°F. cast iron had a tensile strength of 7900 lbs. per square inch. That is, it had lost 58% of its normal strength at 70°F.

The tensile strength of cast Nichrome at 1700°F. is 24,500 lbs. per square inch, approximately 210% greater than the tensile strength of cast iron at 1708°F. When cold, Nichrome has a tensile strength of about 45,000 to 50,000 lbs. per square inch.

The durability of cast Nichrome makes the use of Nichrome boxes, pots, tubes and retorts economical for heat treating work and for all operations occurring at high temperatures.

Write for further particulars.

Manufactured under Henderson Patents.

CANADIAN DRIVER-HARRIS CO., Ltd.

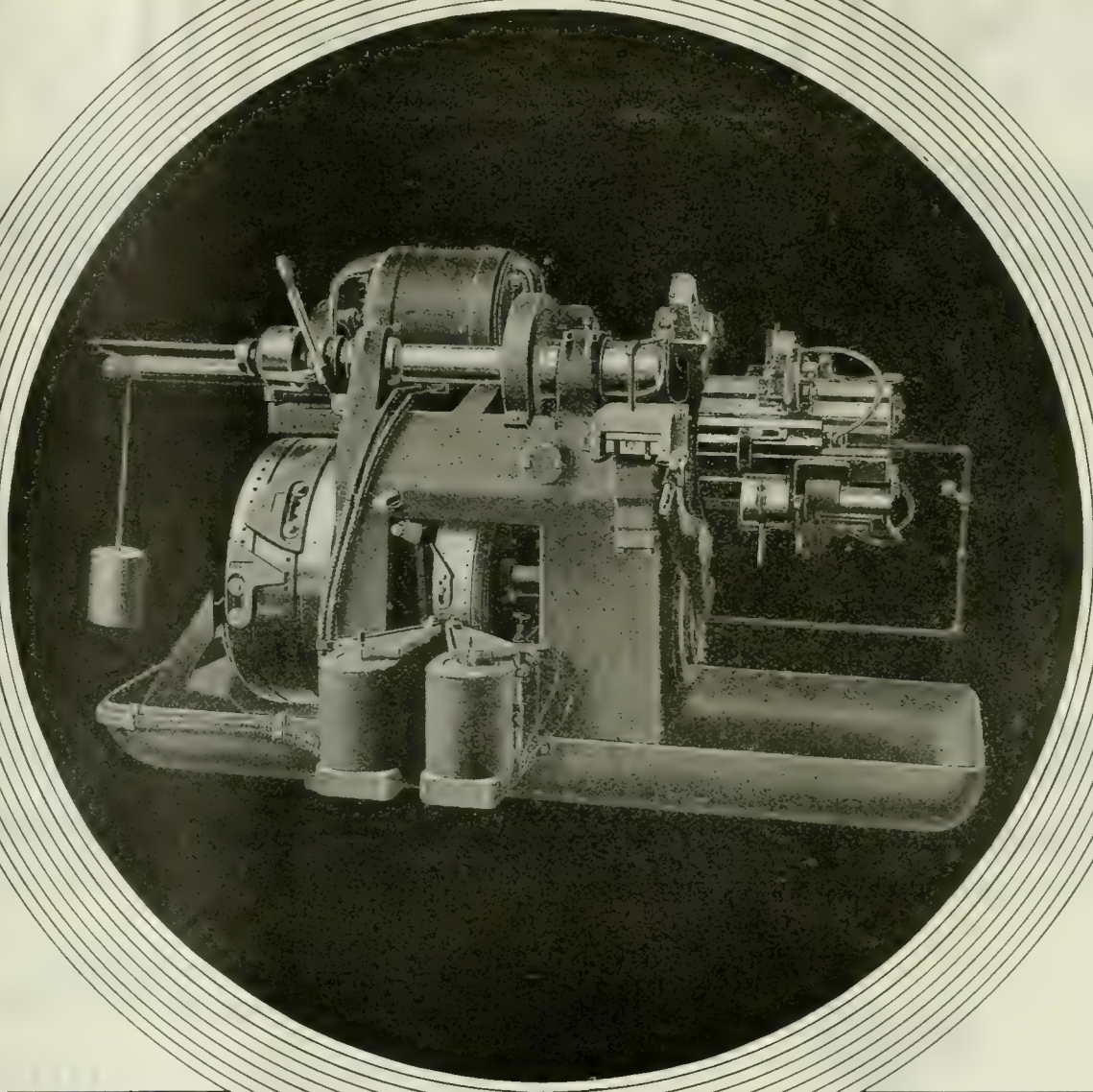
WESTERN OFFICE AND DEPOT CHICAGO 20 S. JEFFERSON ST

WALKERVILLE, ONT. CANADA

AMERICAN OFFICE AND WORKS HARRISON, N.J.

BRITISH WORKS MANCHESTER ENGLAND

24



Let's be specific:

A comparison of two different Turret Lathe jobs for accuracy or for output, merely on heresay or opinion has often resulted in a new attitude when the real figures were known.

Gridley Automatic Turret Lathes stand or fall by their specific performance on *your* work in your shop. May we quote you *specifically?*

Capacities 2¼-5".

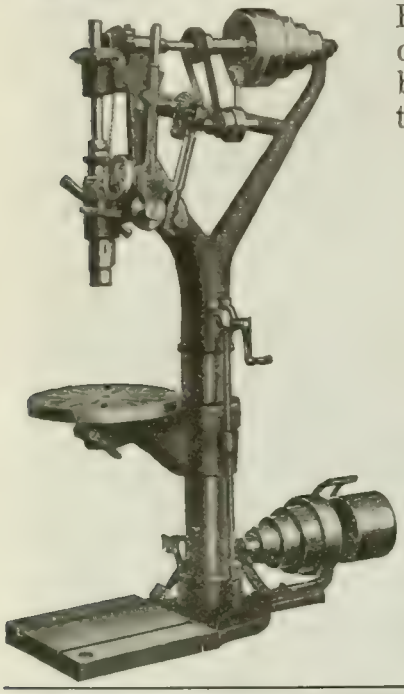
THE NATIONAL ACME COMPANY

AUTOMATIC SCREW MACHINERY AND ITS PRODUCT

CLEVELAND WINDSOR NEW YORK BOSTON CHICAGO DETROIT MONTREAL

Representatives in Principal Foreign Countries

Silver Drills

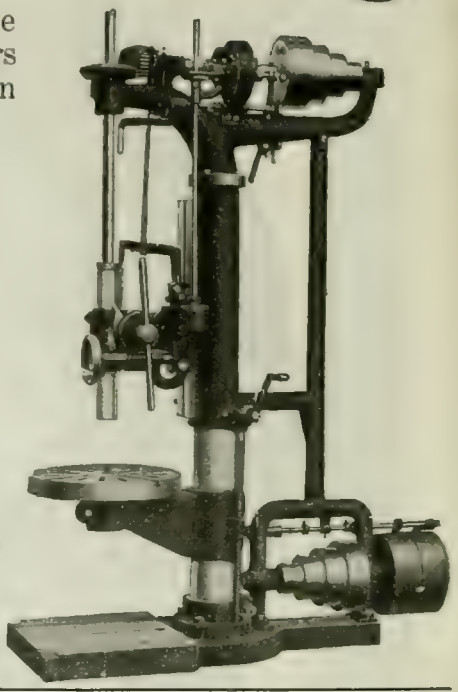


Fast, Strong, Accurate and Dependable drills with an experience of 40 years behind them—they can be depended on to finish the work and do it right.

The 20" is made in four distinct styles with round or square base and can be furnished singly or in gangs of 2, 3 or 4 spindles.

The 25" has eight spindle speeds and six positive geared feeds.

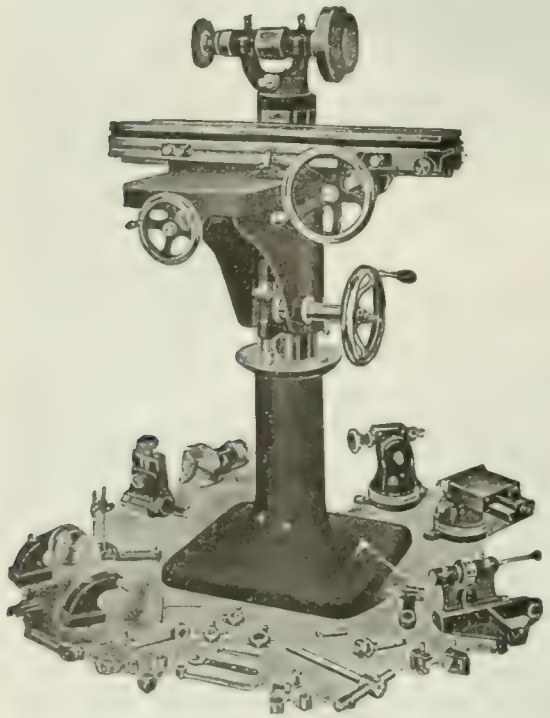
Send for full description and quotations!



The Silver Mfg. Co.

290 Broadway

SALEM OHIO



The Greenfield Universal Grinder

For General Tool Room Work

This grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

It is also suitable for cylindrical, internal and flat work which frequently turns up in the making of tools and jigs.

These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

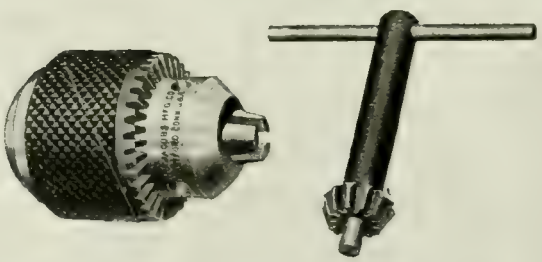
The whole machine is thoroughly well built, well finished, and will be found a dependable, convenient grinder.

Greenfield Machine Company,

GREENFIELD, MASS., U.S.A.

Jacobs Chucks

Sixteen years devoted to the unswerving purpose of building service into its products has resulted in a success enabling this Company to be of genuine aid to the manufacturers of America. The leading qualities — efficiency, convenience, accuracy, — which are wrought into the product also characterize the manner of supplying the product.

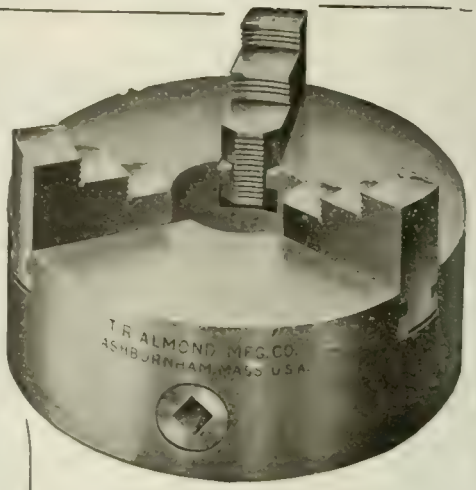


The Jacobs Mfg. Co.

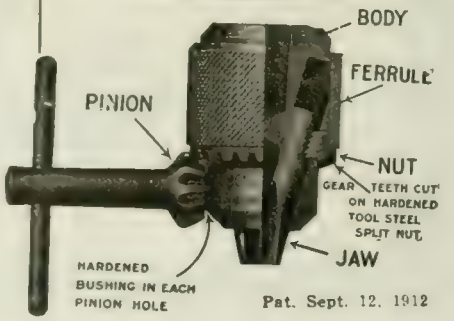
Hartford ~ Connecticut.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



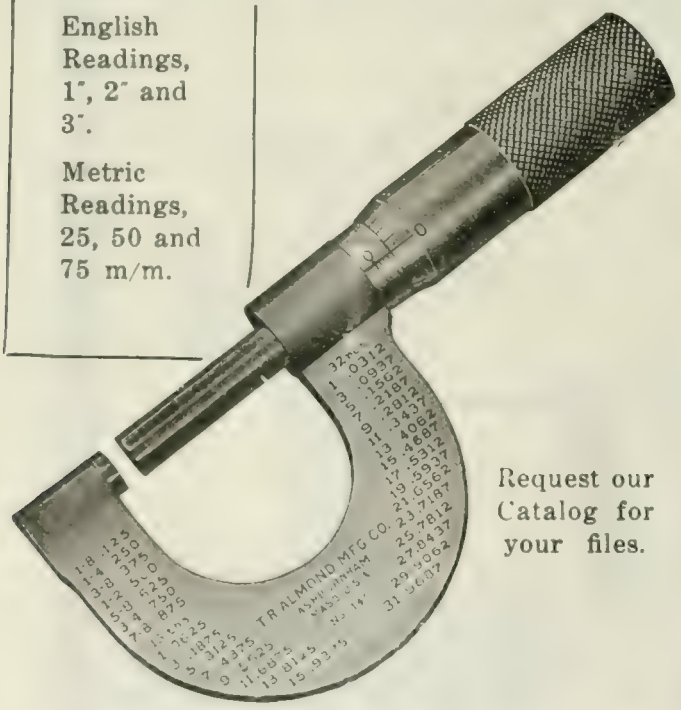
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

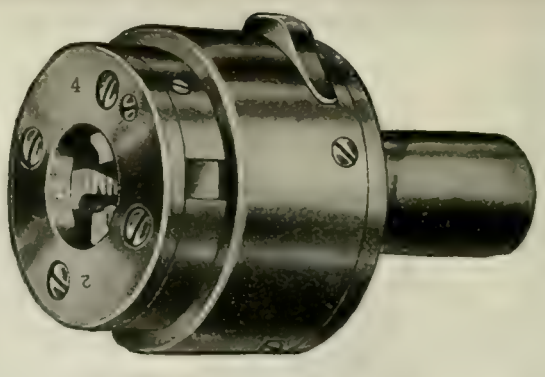
English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



Request our Catalog for your files.

T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.



H&G Die Heads

are of small outside diameter compared with the size of work they do.

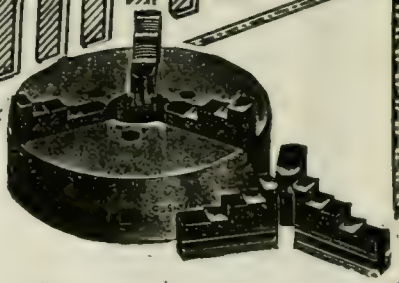
The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.
New Haven, Conn., U.S.A.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck, Hartford, Co. Conn

CHUCKS

RAISED!



"Those Chapman Bearings have been such a big saving, Bill, that I guess you are due for a raise for persuading us to put them in."

This was the conversation of one boss to his foreman.

You too will find it to your interest to find out how much Chapmans will save in your plant. Write us stating:

1. **About how many hangers you have,**
2. **Kind of bearings with which they are equipped,**
3. **Horsepower used,**
4. **Kind of power—steam, electric or gas,**
5. **Whether you are or are not carrying an overload, and if so, how much.**

Records taken where plants have changed from babbitted to Chapman Ball Bearings show a 15-40% saving of the total power. They pay for themselves within two years. **In some plants they have saved enough in power, lubrication and attention to pay for themselves in six months.**

Figure out what a saving of 15% would mean in your plant, then sit down now, or tonight at home, and send us the above information. Help yourself by helping your firm.

Send the above information and ask for catalogue 3-B.

CHAPMAN DOUBLE BALL BEARING CO.

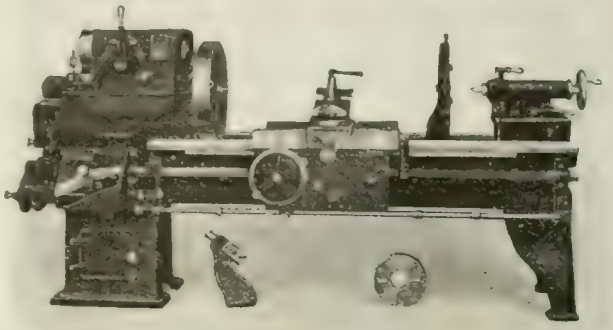
347 Sorauren Ave. TORONTO

BALL BEARINGS Chapman

"YOU PAY FOR THEM WHETHER YOU BUY THEM OR NOT"

Most Powerful Geared Head Made

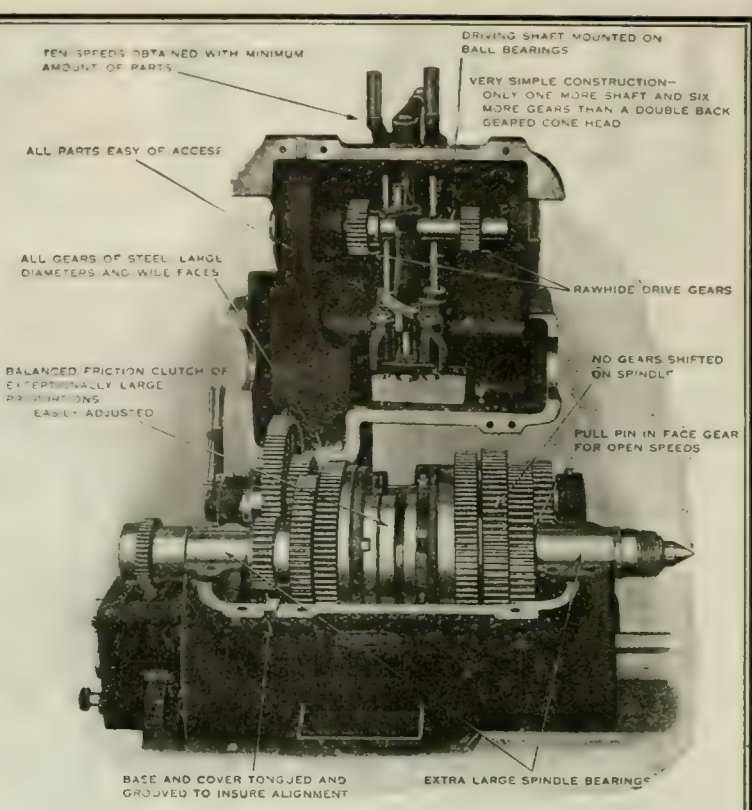
NO OVERHANG, SIMPLE UNIFORM, PROPORTIONATE



CISCO 18" Geared Head Lathe

The Lathe with the Pull
The Lathe of Simplified Accuracy

Made in
14", 16", 18", 20", 24" Engine or Tool Room
Belt or Motor Drive, Plain or Geared Head

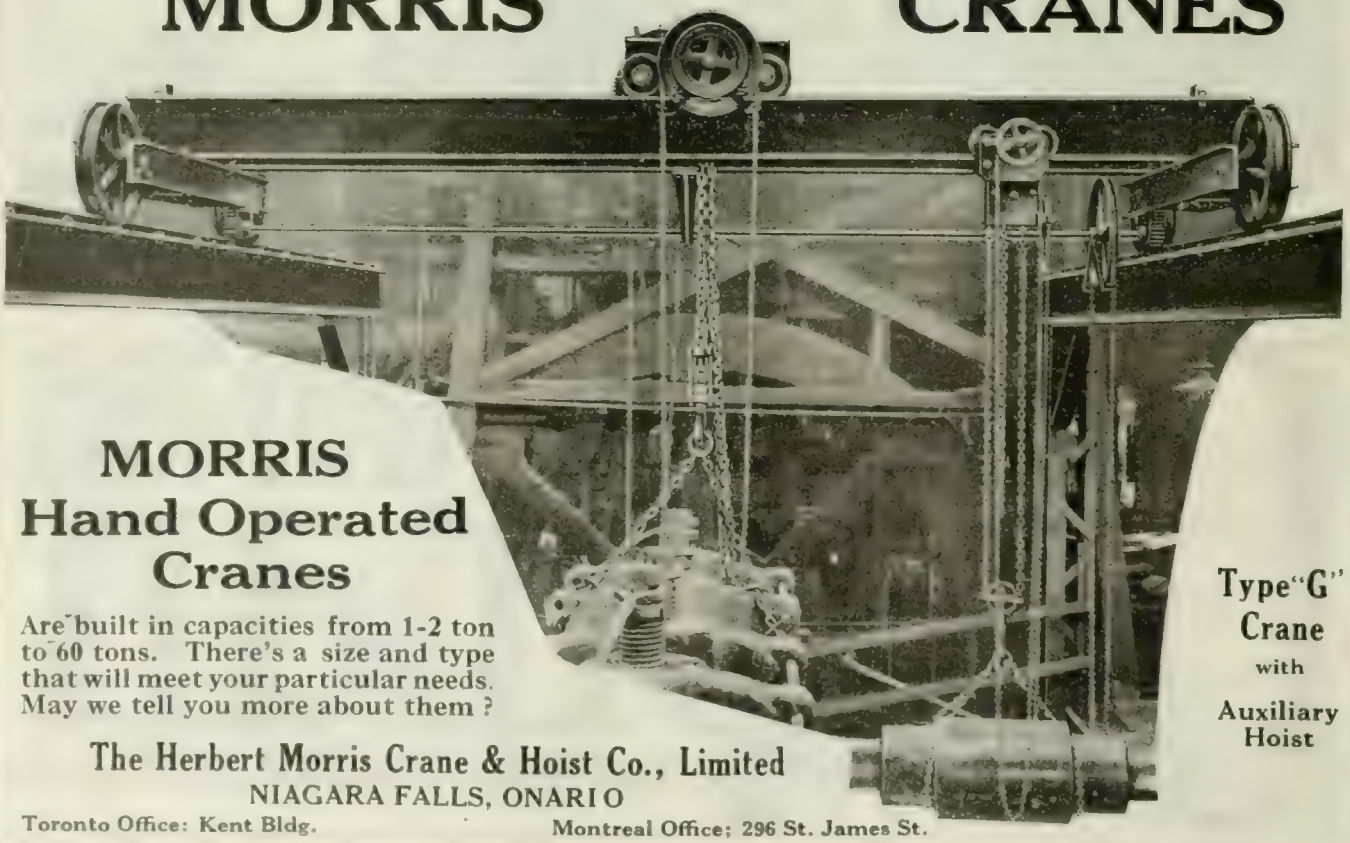


Interior View CISCO Geared Head

The Cisco Machine Tool Company

CINCINNATI, U.S.A.

MORRIS CRANES



MORRIS Hand Operated Cranes

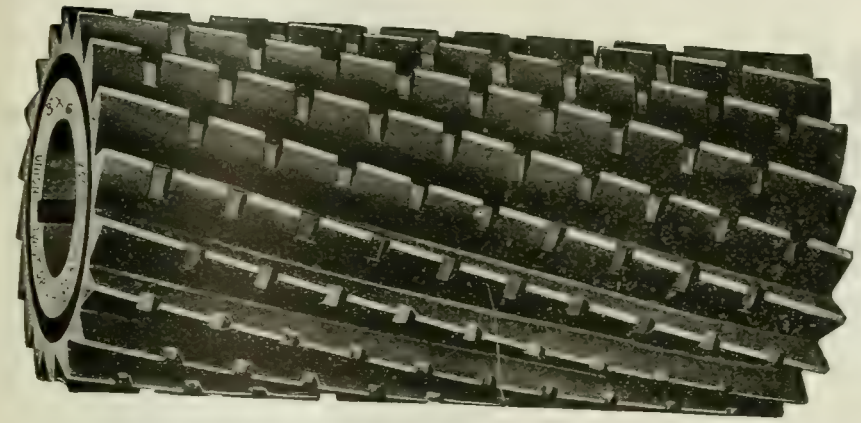
Are built in capacities from 1-2 ton to 60 tons. There's a size and type that will meet your particular needs. May we tell you more about them?

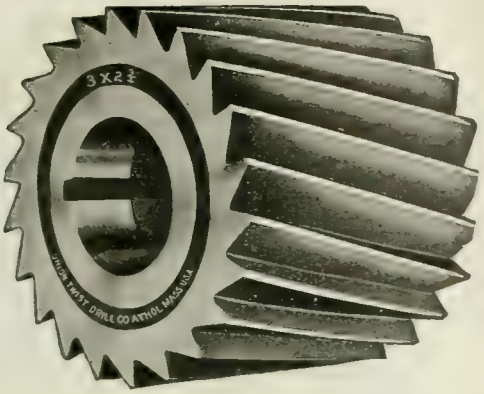
Type "G" Crane with Auxiliary Hoist

The Herbert Morris Crane & Hoist Co., Limited

NIAGARA FALLS, ONARIO

Toronto Office: Kent Bldg. Montreal Office: 296 St. James St.







BUTTERFIELD

TWIST DRILLS GEAR AND MILLING CUTTERS

(Carbon and High Speed Steel)

It will pay every manufacturer, who is not acquainted with Butterfield Tools, to measure their quality by the test of long, hard SERVICE.

You'll find the Butterfield durability the key to tool economy.

Drop us a line for catalogue.







Butterfield & Company, Inc.

Rock Island, Quebec

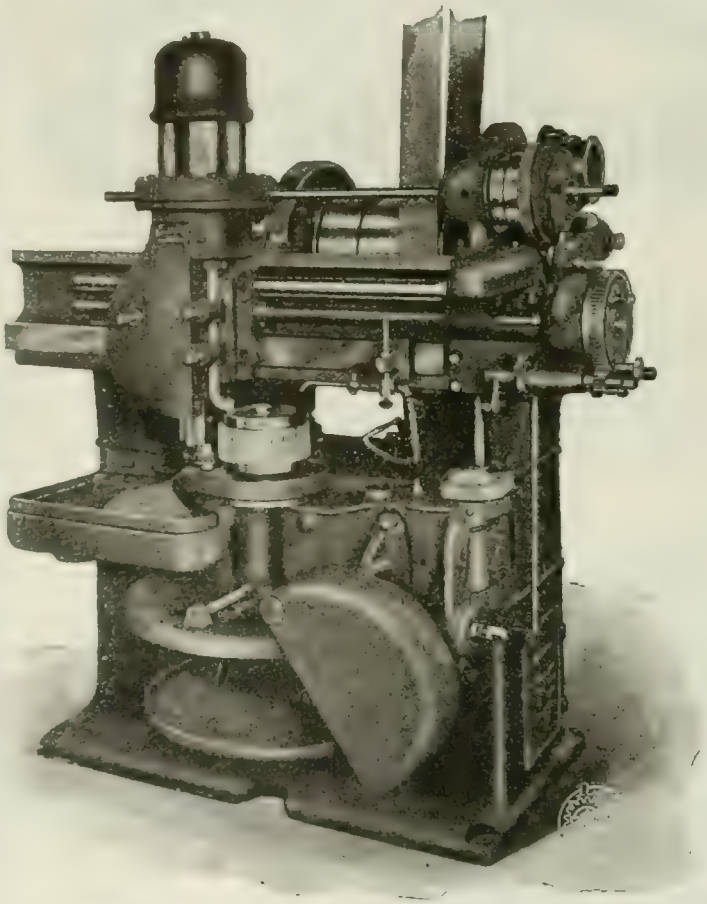
Toronto Office :
220 King Street West

Gear Cutting for Profit

Every business undertaking must in the end stand or fall on its answer to the question "Does it pay?" The gear cutting business is no exception to this rule. The theoretical beauty or mechanical ingenuity of any scheme will not save it. If it is to excell as a business proposition, it must also excell as a profit earner.

Incorporated in the Fellows Gear Shaper are four of the necessary essentials for profitable gear cutting, which we might term: **accuracy, uniformity, output** and **adaptability.**

Accuracy: The Gear Shaper Cutter is an original cutter generated by grinding after hardening. It is not copied from any templet, each cutter being a master tool of great accuracy.



Fellows Spur Gear Shaper, adapted to the cutting of both internal and external gears, as well as being capable of handling a large range of other work.

Uniformity: All Gear Shaper Cutters are alike as far as accuracy is concerned, because all "hand and eye" methods of manufacture are eliminated. The Gear Shaper is so constructed that it uses this accurate cutter to the best possible advantage.

Output: The question of output is inherent in the Gear Shaper process, and is implanted in the design of the machine.

Adaptability: The Gear Shaper will cut external or internal spur gears, shoulder gears, cluster gears, and, in addition, will handle a large range of work that cannot be cut on any other type of gear cutting machine.

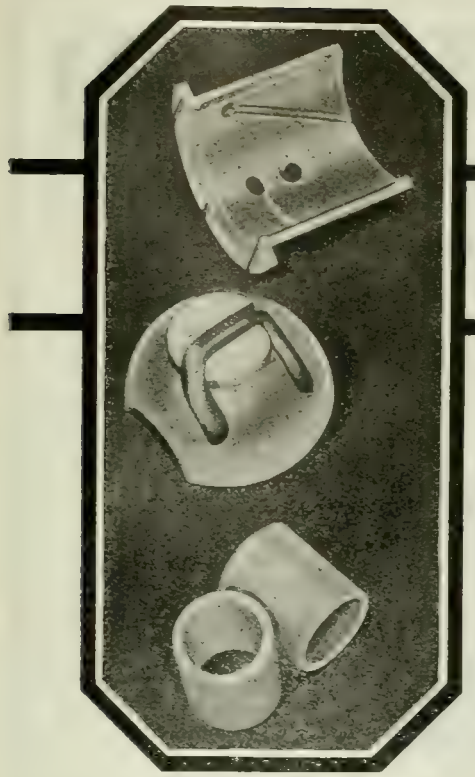
The Gear Shaper stands in a class by itself, and excells as a profit earner for large and small users of gears alike. It is just as much at home in the small jobbing shop as it is in the large manufacturing plant, turning out thousands of gears.

Further information regarding the many advantages of this type of machine can be obtained from our general catalogue, "Commercial Gear Cutting," a copy of which we will gladly send to those interested.

FOREIGN AGENTS: Alfred Herbert Ltd., Coventry, England. Societe Anonyme, Alfred Herbert, 47 Boulevard de Magenta, Paris, France. Societa Anonima Italiana, Alfred Herbert, 42 via Cajazzo, Milan, Italy. Alfred Herbert Ltd., 14 Yamashita-cho, Yokohama, Japan. Societe Anonyme, Alfred Herbert, Barcelona, Spain. Societe Anonyme Belge, Alfred Herbert, 36 Rue de Laekin, Brussels, Belgium. A. B. Galco Ltd., Stockholm, Sweden.

The Fellows Gear Shaper Company

Springfield, Vermont, U.S.A.



FRANKLIN DIE-CASTINGS

Machining small parts wastes stock and requires expensive skill.

Die-castings are cheaper, and often better where their use is advisable.

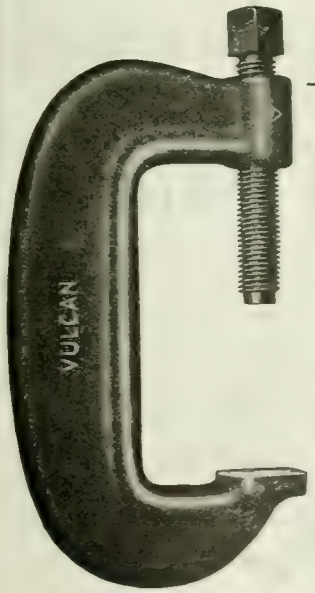
As the originators of die-castings we have probably helped decide, more than any other concern, where die-castings could be used in different and difficult products.

We will help you with any problem you may have.

We are prepared to quote on Die-castings in Aluminum, Lead, Tin and Zinc base alloys.
You may gain knowledge as to die-casting possibilities by sending for our Booklet "C."
A sample part, or a blue print enables us to make report and recommendations to you. Write us.

FRANKLIN MANUFACTURING COMPANY

746 GIFFORD STREET, SYRACUSE, NEW YORK, U.S.A.



Williams' Drop-Forged Clamps

CAST Clamps may cost less, but they are not cheaper—first cost is not the only factor to be considered. No cast clamp can, or does, stand the constant strain of severe usage.

Williams' Clamps are all drop-forged and are then subjected to a refining heat-process which greatly increases their stiffness and strength. They are thoroughly dependable and render superior service under the hardest and most exacting conditions.

Williams' lines of "C" Machinists' and Scrap Clamps provide a wide range of sizes for all clamping service. "There's a Williams' Clamp for every purpose." They are carried by leading dealers and are all fully guaranteed.

A copy of our Machinists' Tools Booklet will be sent on request.

J. H. Williams & Co.

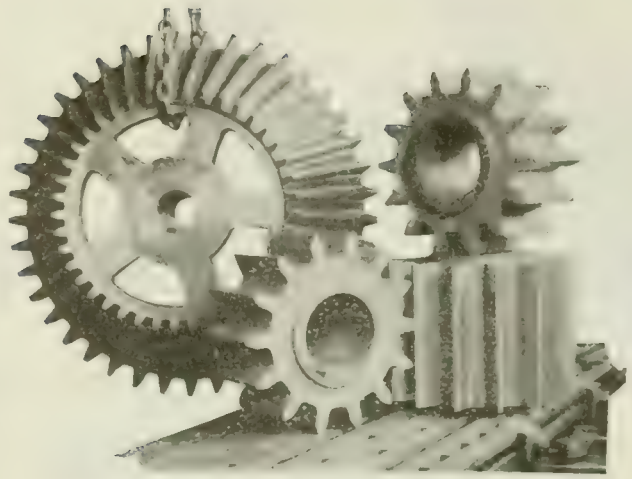
"The Drop-Forging People"

45 Richards Street - - - Brooklyn, New York

The A. G. Low Co., Ltd., 45 Pacific Ave., Saskatoon, Sask., Agents for Manitoba, Saskatchewan, Alberta and British Columbia

CUT GEARS

Mill Gearing



These Semi-Steel Pinions have tooth thickness 35/100 of circular pitch, to mate with wood mortice tooth gears.

Write to

Hamilton Gear Co., Ltd.

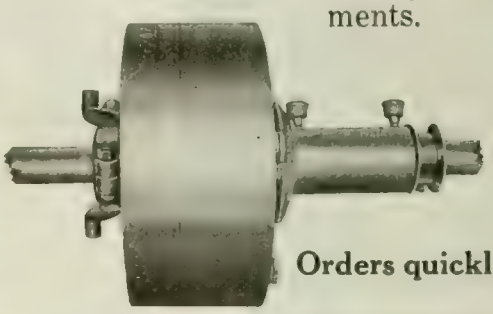
Van Horne St., TORONTO

BERNARD

is the Canadian-made Clutch—reliable, safe and modern.

There Is No Better Friction Clutch

Some cost more **because they are imported.** But, foreign or Canadian-made, no other clutch will give better satisfaction. Let us know your requirements.



Orders quickly filled.

The A. Bernard Industrial Co.

Manufacturers of High Grade Power Transmission Appliances

Office and Works: Fortierville, Quebec, Canada

Philadelphia GEAR Works

VINE STREET PHILADELPHIA, PA.

Spur, Bevel, Spiral, Herringbone and Intermittent

GEARS and PINIONS

Made in all kinds of metals, rawhide and fibre

SOCKET WHEELS
MADE TO ORDER

DISTRIBUTORS OF
DIAMOND CHAINS

For Power Transmission, Machinery and Motor Trucks, Motor-Cycles and Bicycles.

We ship gears to all parts of Canada. Write us when you want good gears, good service, good prices.

Get our Catalogue: "All About Gears."



BEVEL
BEVELS

There's a Famous Five File for Every Kind of Work

And every one is made of high grade steel, and ground and cut for its particular purpose.

Give your men Famous Five Files to work with, and you will get good results.

Also teach them to turn in a file as soon as it becomes dull.

You do not need to be afraid to do this with Famous Five Files, because they will not grow dull quickly.

Specify them when ordering.

They are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by



The Scientific Metallic Blasting Abrasive—

ANGULAR GRIT

One ton of ANGULAR GRIT equals carloads of sand. Its angular and irregular cutting points clean raw castings and forgings quicker and better than either sand or shot.

No dust, no sand bins or sand dryers are necessary where ANGULAR GRIT is used.

Trade Mar Reg. U.S. Pat Office

Give ANGULAR GRIT a trial and note the difference between it and shot Globules or sand which you may be using. You'll save much labor and reduce your blasting cost anywhere from 20% to 80%.

Cuts Sand-Blast Costs



Pittsburgh Crushed Steel Co.

Established 1888

PITTSBURGH, PA., U.S.A.

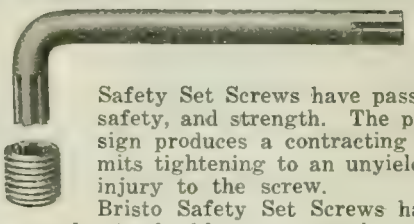
Canadian Representatives:
Williams & Wilson Ltd.
Montreal, P.Q.

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DARLING BROTHERS, LIMITED
Engineers, Manufacturers and Founders
120 Prince Street, MONTREAL, P.Q.
Pumps for any Service—Steam Appliances—Freight Elevators—Webster Vacuum Heating System.

PRESSES and SHEARS
Sheet Metal Working Machinery
THE D. H. STOLL CO., INC.
26 Lansing St., BUFFALO, N.Y.

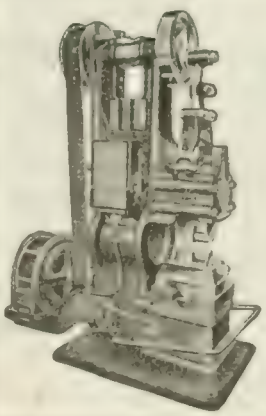
Bryant Chucking Grinder Company
Springfield, Vermont
Builders of
Hole, Hole and Face and Deep Hole Grinders

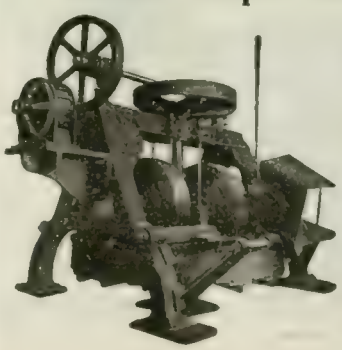
BUILDERS OF MACHINERY
WHAT SET SCREWS DO YOU USE ?

TRADE MARK
BRISTO
REG. U. S. PAT. OFF.
Safety Set Screws have passed every test for safety, and strength. The patented fluted design produces a contracting effect which permits tightening to an unyielding grip without injury to the screw.
Bristo Safety Set Screws have been adopted as the standard by many prominent machine builders.
Ask for free samples and Bulletin I-809.
THE BRISTOL CO., Waterbury, Conn.
U. S. A.

SKINNER
New Model Standard **DRILL CHUCKS** Geared Pattern Positive Drive

In Stock for Immediate Delivery.
The Skinner Chuck Co.
NEW BRITAIN CONN., U.S.A.


STEEL CASTINGS
ELECTRIC Steel Castings of all kinds from 5 pounds to 5,000 pounds.
PROMPT DELIVERY
Manitoba Steel Foundries, Ltd.
1204 McArthur Building
Winnipeg - - - Manitoba


Fairbanks Hammers
25 to 300 lbs.
Belt or Motor Drive
These Hammers Embody a Design and Workmanship that are unsurpassed.
Send for Catalog
UNITED HAMMER CO.
Oliver Building Boston, Mass.

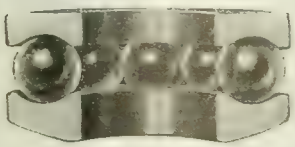
Canadian Steel Foundries Need Frost Improved Sand Mills

WINNING FEATURES
Heavy Mullers
Unloading Device
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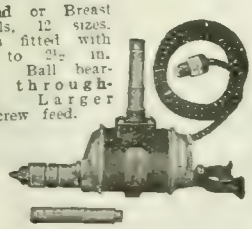
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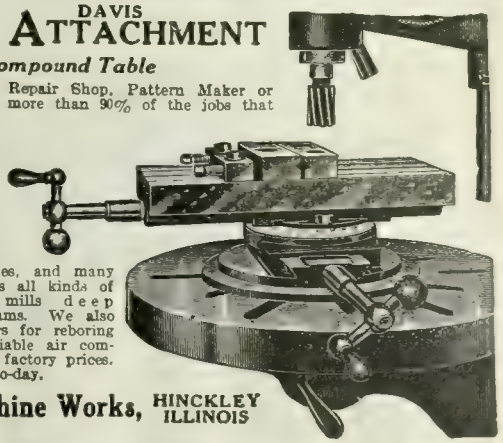
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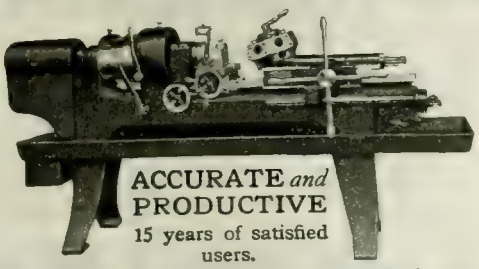


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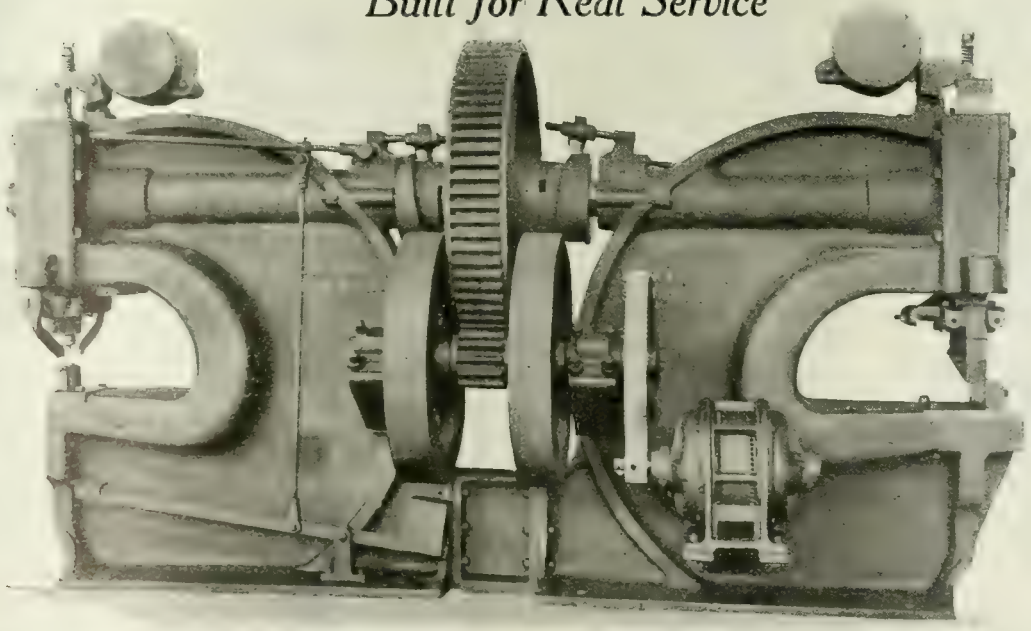
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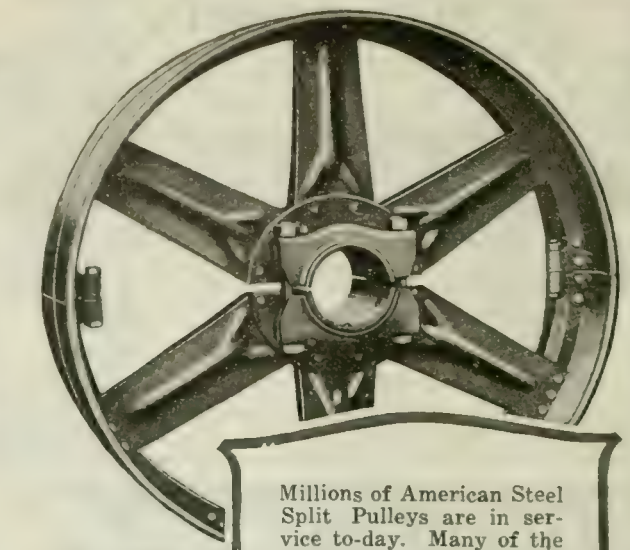
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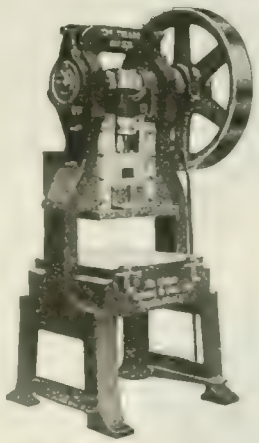


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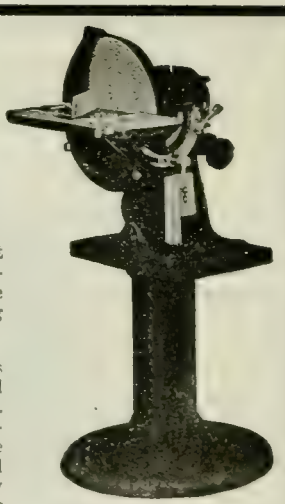
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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd, Walkerville.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Limited, Montreal.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville.

BURRS, IRON AND COPPER
Parmenter & Balloch Co., Gananoque,.

BUSHINGS, BRONZE
Morrow Screw & Nut Co., John, Ingersoll.

CALIPERS
Pangborn Corporation, Hagerstown, Md.
Peck, Stow & Wilcox Co., Southington, Conn.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CABLE, ELECTRIC
International Machinery & Supply Co., Ltd., Montreal, Que.

CALKS, BOOT
Lufkin Rule Co., of Can., Windsor, Ont.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto.

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBIDE
Union Carbide Co., Toronto, Ont.

CARBONIZING BOXES
Can. Driver-Harris Co., Ltd., Walkerville
Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor.

CARRIERS, PNEUMATIC TUBE
Jones & Glasco, Montreal

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Ont
Can. Fairbanks-Morse Co., Ltd, Montreal
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

CASTINGS, MACHINERY
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS BRONZE, COPPER, AND GUN METAL
Algoma Steel Corp., Sault Ste. Marie.
Brockville Foundry Co., Brockville, Ont.
Franklin Mfg. Co., Syracuse, N.Y.
Canada Metal Co., Ltd., Toronto, Ont.

CASTINGS, DIE CAST
Canada Metal Co., Ltd., Toronto, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, STEEL—ALL KINDS
Electric Steel & Metals Co., Welland.
Fellows Bros., Ltd., Chadley Heath, Eng.

CARRIERS COUPLING BOLTS
John Morrow Screw & Nut Co., Ingersoll
Alexander Fleck, Ltd., Ottawa.
Greenleafs Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal.
Tallman Brass & Metal Co., Hamilton.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie.
International Machinery and Supply Co., Ltd., Montreal, Que.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., A., Fortierville, Q.
Brown, Boggs Co., Ltd., Hamilton.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull
International Malleable Iron Co., Guelph
Kennedy & Sons, Ltd., Wm., Owen Sound.
Katie Foundry, Ltd., Galt, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver-Harris Co., Ltd., Walkerville

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull.
Kennedy & Sons, Ltd, Owen Sound.

CASTINGS, MALLEABLE
International Malleable Iron Co., Guelph

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull.

CEMENT MACHINERY
Can. Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son, Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt. & Son, Montreal.
Hurlburt, Rogers Mch. Co., South Sudbury, Mass.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros Co., of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

CHAIN, WELDED COIL
Fellows Bros., Ltd., Chadley Heath, Eng.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Ford Chain Block & Mfg. Co., Phila., Pa.
Garlock-Walker Machy. Co., Toronto.
Morris Crane & HoistCo., Herbert, Niagara Falls, Ont.
Ross Lewis & Son, Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Jones & Glassco, Montreal, Que.

CHAINS, AGRICULTURAL
Morse Chain Co., Ithaca, New York.

CHAINS, AUTOMOBILE ENGINE
Morse Chain Co., Ithaca, New York.

CHAINS, BOOM, TIMBER
Fellows Bros., Ltd., Chadley Heath, Eng.

CHAINS, BICYCLE, DRIVE AND BLOCK
Morse Chain Co., Ithaca, New York.

CHAINS, FORGED
Fellows Bros., Ltd., Chadley Heath, Eng.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson Ltd., Montreal, Que.

CHAINS, POWER TRANSMISSION
Morse Chain Co., Ithaca, N.Y.

CHAINS, SPROCKET WHEEL
Morse Chain Co., Ithaca, N.Y.

CHAIN DRIVES
Can. Link Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 318 Starr Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Lab'tory, Ltd., Toronto

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co. Galt, Ont.
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Ltd., Montreal, Que.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., Ashburnham, Mass.
Bicknell-Thomas Co., Greenfield, Mass.
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & S'ply Co., G. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Mach'y Co., Toronto.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Modern Tool Co., Erie, Pa.
Rice Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.
Williams & Wilson, Ltd., Montreal, Que

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont
Bicknell-Thomas Co., Greenfield, Mass.
Can. Blower & Forge Co., Kitchener.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Bicknell-Thomas Co., Greenfield, Mass.
Victor Tool Co., Waynesboro, Pa.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto.
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach. Co., Brazil, Ind.
Williams & Wilson, Ltd., Montreal, Que.

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., Inc., Fort Wayne, Ind.
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCK SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Wright Mfg. Co., Lisbon, Ohio.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Q.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Jones & Glassco, Montreal, Que.
Positivte Clutch & Pulley Wks., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

COAL HANDLING MACHINERY
Bond Engineering Works, Toronto, Ont.
Can. Link Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal.

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto.
Sleeper & Hartley, Inc., Worcester, Mass.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

COLD ROLLED STRIP, ALL METAL COLLARS, SHAFTING
Can. Driver-Harris Co., Ltd., Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston.
Hardinge Bros., Inc., Chicago, Ill.
Wilson & Co., J. C. Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd-Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll Rand Co., Sherbrooke.
Cleveland Pneumatic Tool Co., Toronto.
Curtis Pneumatic Machy. Co., St. Louis
Garlock-Walker Machy. Co., Toronto.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

CONNECTING RODS
Canada Found's & Forgings, Ltd., Welland, Ont.

CONTRACT WORK
Banfield, W. H., & Sons, Toronto.
Brown Engineering Corp., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
Homer & Wilson, Hamilton, Ont.
Katie Foundry, Ltd., Galt, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

CONTROLLERS, MAGNETIC BRAKES, ELEC. WINCHES, MONO RAIL HOISTS
Volta Mfg. Co., Welland, Ont.

CONTROLLERS AND STARTERS
Williams Mach'y Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

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MacGovern & Co., Montreal, Que.

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Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

COOLERS, WITH DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

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Bertram & Sons Co., John, Dundas, Ont.
Garlock-Walker Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
Can. Blower & Forge Co., Kitchener.

COPPER, BUS BAR, SHEET, PATES, RODS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

COUNTERSHAFTS
Almond Mfg. Co., Ashburnham, Mass.
Gray Ball Bearing Co., Ltd., Toronto.
Baird Machine Co., Bridgeport, Conn.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Williams & Wilson, Ltd., Montreal, Que.

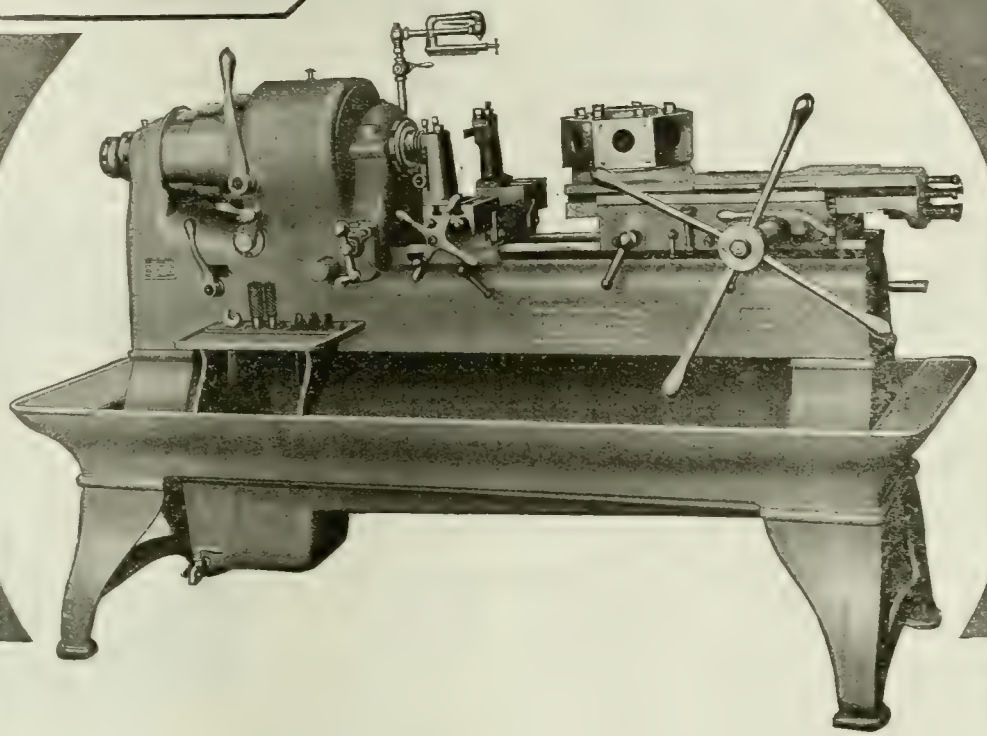
COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que

COUPLINGS, RAPID HOSE
Int. Machinery & Supply Co., Ltd., Montreal, Que.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co., of Canada, Toronto.
Gardner, Robt. & Son, Montreal.
Independent Pneumatic Tool Co., Chicago
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
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Northern Crane Works, Walkerville

Brown & Sharpe
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Screw Machines



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THE No. 6 Plain Screw Machine is one of the most popular machines in the modern shop. It is readily adaptable to the working of cast iron, machine steel or metals of this character.

The rugged design and wide range makes it suitable to a wide variety of work. The convenient location of all operating levers combined with independent feeds and speeds make it a primary support in keeping up production.

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COVERS, OIL HOLE
Can. Wineley Co., Ltd., Windsor, Ont.

CRANES, GANTRY
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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Que.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Williams & Wilson, Ltd., Montreal, Que.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis.
Dominion Bridge Co., Montreal
Hepburn, Jean T., Ltd., Toronto
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York
Northern Crane Works, Walkerville.

CRANES, TRAVELLING AND JIB
Fellows Bros., Ltd., Chalkley Heath, Eng.

CRANK SHAFTS
Canada Found'g & Forgings Ltd., Welland
Williams & Co., J. H., Brooklyn, N.Y.

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Can. Link-Belt Co., Toronto.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice Lewis & Son, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson Ltd., Montreal, Que.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh

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Can. Blower & Forge Co., Kitchener.
Northern Crane Works, Walkerville.

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Bowser & Co., S. F., Inc., Fort Wayne, Ind.

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Electric Steel & Metals, Ltd., Welland.

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CUTTERS, BOLT
See Bolt Cutters.

GEAR CUTTERS
Fellows Gear Shaper Co., Springfield, Vt.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co., Toronto.

CUTTER HEADS
Oliver Machinery Co. Grand Rapids, Mich

CUTTERS, PIPE (See Pipe Cutters)

CUTTERS, MILLING
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Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
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Davidson Tool Mfg. Co., New York, N.Y.
Elliott & Whitehill Mach. & Tool Co., Galt, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Taylor Mfg. Co., Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

CUTTING-OFF MACHINES
Armstrong Bros., Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Can. Fairbanks-Morse Co., Ltd., Montreal
Curtis & Curtis Co., Bridgeport, Conn.
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Gisholt Machine Co., Toronto
Garvin Machine Co., New York
Greenfield Tap & Die Corp., Greenfield Mass.
Hilles & Jones, Wilmington, Del.
Hoefer Mfg. Co., Freeport, Ill.
Rogers Machine Co., South Lancaster, Mass.
Hall & Sons, John, H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound.
Niles-Bement-Pond Co., New York, N.Y.
Pond Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tap & Machine Co., Racine, Wis.
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Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Cataract Refining Co., Ltd., Toronto.

CUTTING OIL, RECLAIMING SYSTEM
Bowser & Co., Inc., Fort Wayne, Ind.

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Welding & Supplies Co., Montreal, Que.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor

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Ford-Smith Machine Co., Hamilton, Ont.
Standard Conveyor Co., Inc., Bay City, Mich

CYLINDERS, AUTOMATIC REBORING TOOLS AND REAMERS
Hinckley Machine Co., Hinckley, Ill.
Kelly Reamer Co., Cleveland, O.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co., Montreal
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Anderson & Co., of Can., Geo., Montreal
Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Truing Tool Co., Detroit
Williams & Wilson, Limited, Montreal

DIAMONDS, CARBON AND BORTZ
Wheel Trueing Tool Co., Detroit

DIAMONDS, BLACK AND ROUGH
Joyce-Koebel & Co., Inc., New York
Wheel Truing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

DIE HEADS, AUTOMATIC
Greenfield Tap & Die Corp., Greenfield Mass
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa
Pittsburgh Steel Stamp Co., Pittsburgh.

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A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co., of Canada, Galt.

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Atkins & Co., Ltd., Wm., Sheffield, Eng
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Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal
Gardner Robt. & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
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Marshall, Son & Bunney, Toronto.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont
Robert Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Montreal.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont
Williams & Wilson, Ltd., Montreal, Que

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Ltd., Montreal, Que.

DIES, THREADING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIE SINKERS
Becker Milling Machine Co., Boston
Garvin Machine Co., New York
Pratt & Whitney Co., Dundas, Ont.

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Butterfield & Co., Rock Island, Que
Firth & Sons, Thos., Montreal, Que
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt.

DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Canada, Galt, Ont

DIES, SELF-OPENING
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Monarch Machine & Tool Co., Detroit.
Wells Brothers Co. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Oliver Mach. Co., Grand Rapids, Mich.

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Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.
Firth & Sons, Thos., Montreal, Que.
Kayser Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

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Wells Bros. Co. of Can., Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor.

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Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co., of Can., Galt, Ont.

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Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Montreal.

DIRECT CONNECTED UNITS
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W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.

DRAWING
Henry Hope & Sons, Ltd., Peterboro, Ont.

DRESSERS, GRINDING AND EMERY WHEEL
Can. Desmond-Stephan Mfg. Co., Hamilton
Wheel Trueing Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal

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Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener.
Canada Machinery Corp., Galt, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York
U. S. Mach. Tool Co., Cincinnati, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILL RODS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLING MACHINES, GANG
Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas.
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal
Foss Mchy. & S'ply Co., G. F., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Mach. Co., Toronto.
Garvin Machine Co., New York.
Hoefer Mfg. Co., Freeport, Ill
Henry & Wright Mfg. Co., Hartford, Conn
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
Nat. Automatic Tool Co., Richmond, Ind.
Niles-Bement-Pond Co., New York
Rockford Drilling Mach Co., Rockford, Ill

DRILLING MACHINES, RADIAL AND TURRET
John Bertram & Sons Co., Dundas
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Henry & Wright Mfg. Co., Hartford.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canadian Machinery Corp., Galt, Ont.
Geo. F. Foss Mch. & S'ply Co., Montreal
Garlock-Walker Mach. Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati
Williams & Wilson, Limited, Montreal.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
Blomquist-Eck Mach. Co., Cleveland, O.
John Bertram & Sons Co., Dundas.
Garlock-Walker Mach. Co., Toronto, Ont
Can. Blower & Forge Co., Kitchener.
Canada Mach. Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Fry's (London), Ltd., London, Eng.
Garlock-Walker Mach. Co., Toronto, Ont.
Hoefer Mfg. Co., Freeport, Ill
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Nat. Automatic Tool Co., Richmond, Ind.
Rockford Drilling Mach. Co., Rockford, Ill
Niles-Bement-Pond Co., New York.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, SPECIAL
Hoefer Mfg. Co., Freeport, Ill.

DRILLING MACHINES, WALL RADIAL
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Wickes Bros. Saginaw, Mich.

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Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
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DRILLS, BENCH
Aikenhead Hardware Co., Toronto.
W. F. & John Barnes Co., Rockford, Ill
Can. Blower & Forge Co., Kitchener.
Can. Fairbanks-Morse Co., Montreal.
Geo. F. Foss Mch. & S'ply Co., Montreal
Fry's (London), Ltd., London, England
Garlock-Walker Machinery Co., Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
U.S. Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll
Morse Twist Drill & Machine Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co., of Can., Walkerville
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener.
Cleveland Twist Drill Co., Cleveland.
Geo. F. Foss Mch. & S'ply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Can., Walkerville

DRILLS, CARBON
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.
John Morrow Screw & Nut Co., Ingersoll

DRILLS, ELECTRIC, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati
Geo. F. Foss Mch. & S'ply Co., Montreal
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Pilot Steel & Tool Co., Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.
U. S. Electrical Tool Co., Cincinnati, O.
A. R. Williams Mach. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, EMERY
Garlock-Walker Mach. Co., Toronto, Ont.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong-Whitworth of Can., Montreal.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal
H. A. Drury Co., Montreal.
Geo. F. Foss Mch. & S'ply Co. Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson Ltd., Montreal, Que

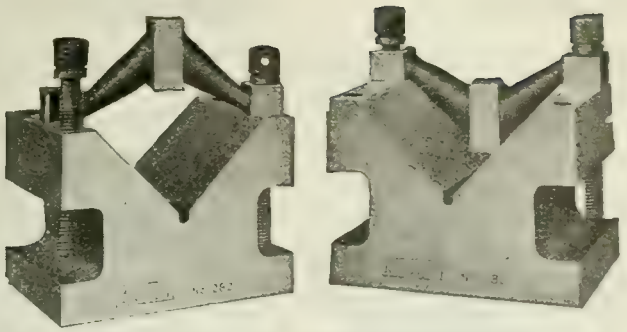
DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mach. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co., Toronto.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.

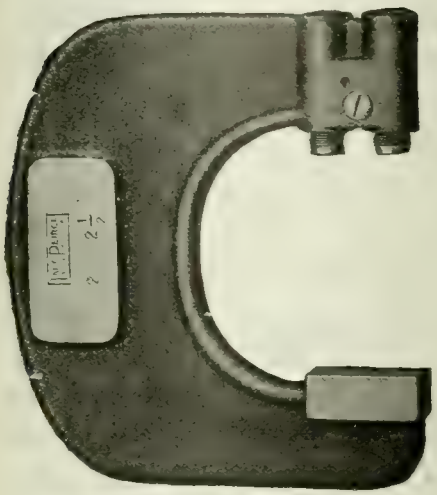
DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.

Standardized Tool-Room Equipment

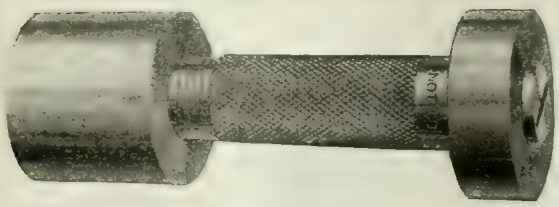


V Blocks—Style 130 –Assembled with Clamps

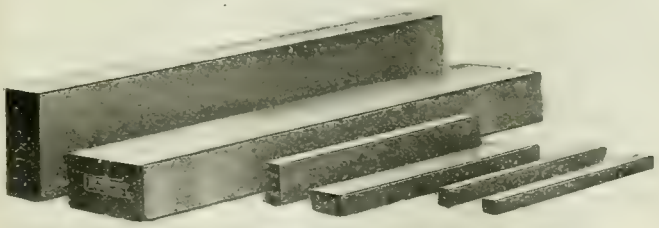
No modern shop can afford to give valuable time to the production of the miscellaneous tool-room equipment now required for testing and working purposes. Besides diverting real production time, it results in a varied assortment of tools, the duplication of which in the ordinary shop would entail great inconvenience and loss of time.



Adjustable Gage—Style 32



Limit Plug Gage—Style 10



Steel Parallels—Style 150

The Taft-Peirce standardized line of shop and tool-room equipment represents the latest and best design and the highest degree of accuracy. Specials are made to order and duplicate of standard pieces can be promptly shipped. We offer you a service that will put your shop efficiency on a higher plane of excellence than ever before.

Bulletin No. 104-E describes the complete line.

2074

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Detroit: Majestic Building

Williams & Wilson, Ltd., Montreal and Quebec

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[illegible] Co., Toronto, Ont.
A. R. Williams Machy. Co., Toronto, Ont.
[illegible] & Nut Co., Ingersoll, Ont.
[illegible] & Mfg. Co., New Bedford, Mass.
[illegible] & Machy. Co., Toronto, Ont.
[illegible] Co., Toronto, Ont.
[illegible] Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville.

DRILLS, ROCK

[illegible] Co., Montreal, Que.
Cleveland Pneumatic Tool Co., Toronto.
The Foss Mchy. & Supply Co., Montreal.
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Morrow Screw & Nut Co., Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Can., Walkerville.

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DRIVES, CHAIN

See Belting, Chain.

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DUST HANDLING EQUIPMENT

Pangborn Corporation, Hagerstown, Md.

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MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

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Electric Steel & Metals, Ltd., Welland.
General Steel Co., Milwaukee, Wis.

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Canada Wire & Iron Goods Co., Hamilton

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Katie Foundry, Galt, Ont.

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Curtis Pneumatic Machy. Co., St. Louis.
Williams & Wilson, Ltd., Montreal, Que.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Garvin Machine Co., New York
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Canada Emery Wheel Co., Hamilton.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Williams & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

EMERY WHEEL DRESSINGS

Wilson Truing Tool Co., Windsor, Ont.

END MILLS

John Morrow Screw & Nut Co., Ingersoll

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MacGovern & Co., Montreal, Que.

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A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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ENGRAVERS

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ESCUTCHEON PINS

Parmenter & Bulloch, Gananoque, Ont.

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Pangborn Corporation, Hagerstown, Md.
Williams & Wilson, Ltd., Montreal, Que.

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Walton Co., The, Hartford, Conn.

EYE BOLTS AND NUTS

Can. Foundries & Forgings, Ltd., Welland, Ont.

EYE PROTECTORS

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Strong, Kennard & Nutt Co., Cleveland.
Willson & Co., Inc., T. A., Reading, Pa.

FACTORY GATES

Page Steel & Wire Co., Adrian, Mich.

FANS

Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.

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Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

FENCE, IRON AND FACTORY

Can. Wire & Iron Goods, Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN

Vanadium-Alloys Steel Co., Pittsburgh, Pa

FILES

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Atkins & Co., Wm., Sheffield, Eng.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Marshall, Son & Bunney, Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Simonds Mfg. Co., Fitchburg, Mass.
Whitman & Barnes Mfg. Co., Akron, O.
Wilkinson & Kompass, Hamilton, Ont.

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Brown Engineering Corp., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
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Toronto Tool Co., Toronto, Ont.

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FLANGING CLAMPS

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Rice Lewis & Son, Toronto, Ont.

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Can. Found. & Forgings, Ltd., Welland.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE FORGING AND WELDING

Victoria Foundry Co., Ottawa.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamp'g Co., Walkerville.
Steel Co. of Canada, Ltd., St. Catharines.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY

John Bertram & Sons Co., Dundas, Ont.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
National Machy. Co., Tiffin, Ohio
Williams & Wilson, Ltd., Montreal, Que

FORGINGS, SPECIAL

Armstrong-Whitworth of Can., Montreal.
Can. Found. & Forgings, Ltd., Welland.
Williams & Co., J. H., Brooklyn, N.Y.

FORMING

H. Hope & Sons of Can., Ltd., Peterboro

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Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FRICTION LEATHERS

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FRICTION SURFACE BELTING

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FUEL OIL SYSTEMS

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Gilbert & Barker Mfg. Co., Springfield.

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Bellevue Furnace Co., Detroit, Mich.
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Gilbert & Barker Mfg. Co., Springfield.
Mechanical Eng'r'g Co., Three Rivers, Q.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Ltd., Montreal, Que.

FURNACES, BLAST

Bellevue Industrial Furnace Co., Detroit.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING

Gilbert & Barker Mfg. Co., Springfield.
Standard Fuel Engr. Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL,

Standard Fuel Engr. Co., Detroit, Mich.

FURNACES, LEAD AND SALT

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FURNACES, RIVETING

Standard Fuel Engr. Co., Detroit, Mich.

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GASOLINE TANKS

Bowser & Co., S. F., Inc., Fort Wayne.

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GAUGES, HYDRAULIC

Taylor Instrument Co., Rochester, N.Y.

GAUGES, MANUFACTURERS, LIMIT, THREAD

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Wells Bros. of Can., Galt, Ont.

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Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
C. E. Johanson, Inc., Toronto, Ont.
Morse Twist Drill & Machine Co., New Bedford.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 318 Stair Bldg., Toronto
Toronto Tool Works, Toronto, Ont.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GAUGES, THREAD

Bicknell-Thomas Co., Greenfield, Mass.

GAUGES, VACUUM AND PRESSURE

Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

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Dom. Found & Steel, Hamilton, Ont.
Kaiser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST

Katie Foundry, Galt, Ont.

GEAR SHAPERS AND CUTTERS

Fellows Gear & Shaper Co., Springfield, V.

GEAR-CUTTING MACHINERY

Bilton Mach. Tool Co., Bridgeport, Conn.
Fellows Gear & Shaper Co., Springfield, V.
Garlock-Walker Mchy. Co., Toronto, Ont.
D. E. Whitton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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GEAR-TURNING MACHINES, BEVEL

Bridgeford Mach. Tool Wks., Rochester.

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GEARS, CHAIN

Morse Chain Co., Ithaca, New York.

GEARS, COMPENSATING

Morse Chain Co., Ithaca, New York.

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Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Hull Iron & Steel Found., Ltd., Hull, Q.
Illinois Tool Works, Chicago, Ill.
Jones & Glasco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.

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Gardner, Robt., & Son, Montreal.
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Philadelphia Gear Works, Philadelphia.
A. R. Williams Machy. Co., Toronto.

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GLUE HEATERS

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Strong, Kennard & Nutt Co., Cleveland.
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GRAPHITE

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Willson & Co., Inc., T. A., Reading, Pa.
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Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

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Can. Winkley Co., Ltd., Windsor, Ont.

GREASES (See Lubricants)

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Foss Mchry. & S'ply Co., G. F., Montreal
Garlock-Walker Machinery Co., Toronto.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH

Wisconsin Electric Co., Inc., Racine, Wis.
Blake & Johnson Co., Waterbury, Conn.
Can. Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co., Toronto.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & S'ply. Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
Perfect Machine Co., Galt, Ont.
United States Elec. Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal.

GRINDERS, CUTTER

Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Milling Mach. Co., Cincinnati.
Foss Mchy. & S'ply. Co., G. F., Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, M.
Heald Machine Co., Worcester, Mass.

Thor

CHIPPING HAMMERS



Drilling in concrete with a size D hammer with a hexagon nozzle. Will drill a hole one inch in diameter, at the rate of one inch per minute.

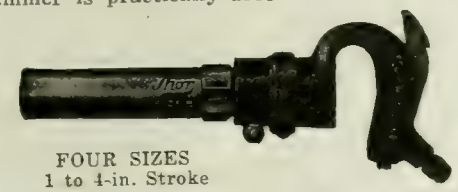
Thor Predominates wherever chippers are used because:

1st. The main valve is large in size and durable, being of the balanced type and having a bearing surface of three square inches.

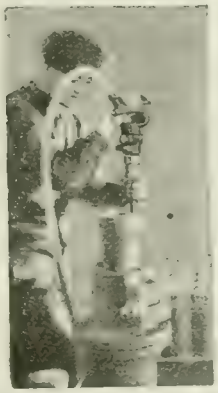
2nd. Two square inches of the bearing surface retain the lubrication constantly, as no air passes over to blow the oil off.

3rd. The handle is equipped with a self-seating throttle valve, which eliminates all leaks.

4th. The barrel and all working parts are hardened and ground and the hammer is practically free from vibration.



FOUR SIZES
1 to 4-in. Stroke



Riveting Base Plates with size B hammer. Let our service engineer call at your plant and explain the various uses to which these hammers can be adapted, and how to obtain the best results on your particular work.

INDEPENDENT PNEUMATIC TOOL COMPANY

General Offices: 600 West Jackson Blvd., CHICAGO, U.S.A.

CANADIAN OFFICES: 334 St. James St., MONTREAL; 32 Front St., TORONTO; 123 Bannatyne Ave. E., WINNIPEG; 1142 Homer St., VANCOUVER

The BARNES DRILLS

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Complete line. 8-inch to 50-inch swing

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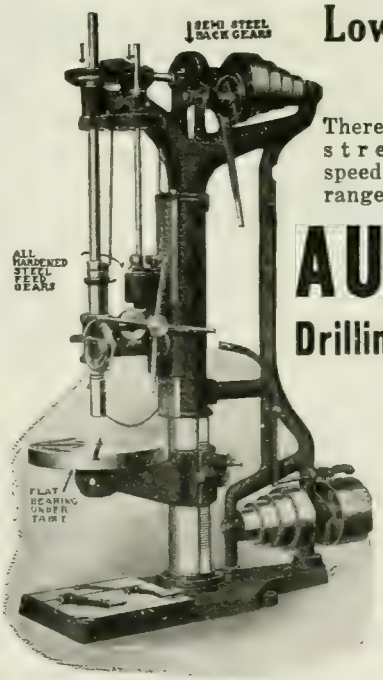
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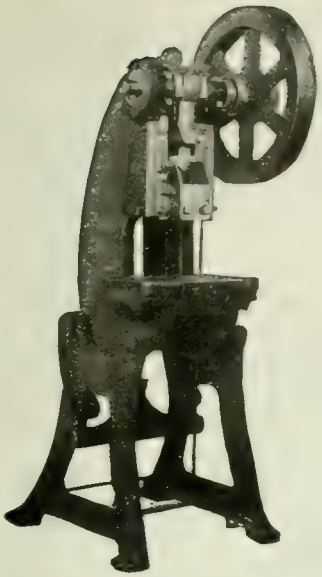
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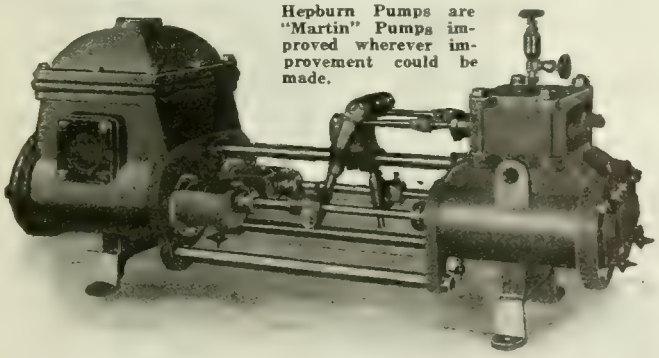
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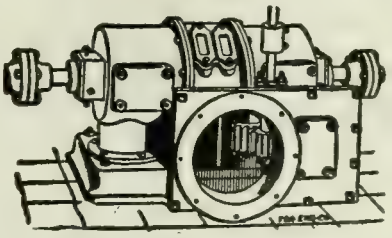


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Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

MILLING CUTTERS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Cleveland Milling Machine Co., Cleveland.
Kearney & Trecker Co., Milwaukee, Wis.
Marshall, Son & Bunney, Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machy. Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
LeBlond Mach. Tool Co., R. K., Cincinnati
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati.
Whitney Mfg. Co., Hartford, Conn.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co, Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Sply. Co., G. F., Montreal
Fox Machine Co., Jackson, Mich.
Garlock Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
LeBlond Mach. Tool Co., R. K., Cincinnati
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & Sply. Co., G. F., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Ltd., Montreal, Que.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
Gray Ball Bearing Co., Ltd., Toronto.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Can. General Electric Co., Toronto.
Garlock-Walker Machy. Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MOTOR SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

MOTORCYCLE FRAME AND FORK
The Dunbar Brothers Co., Bristol, Conn.

MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co., Toronto.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

MULTI-DRILLING, MULTI-BORING, MULTI-TAPPING MACHINERY,
Nat. Automatic Tool Co., Richmond, Ind.

MUNTZ METAL
Brown's Copper & Brass Roller Mills, New Toronto, Ont.

NAIL SETS
Morrow Screw & Nut Co., J., Ingersoll, Ont

NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

NAME PLATES, BRONZE, ETCHED AND STAMPED
Matthews & Co., Jas. H., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.
Turner Brass Works, Sycamore, Ill.

NICHROME CASTINGS
Can. Driver Harris Co., Ltd., Walkerville.

NICKEL
Boker & Co., Inc., H., Montreal, Que.
Pilot Steel & Tool Co., Montreal, Que.

NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

NICKEL STEEL
See Steel

NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES
Hall & Sons, Ltd., John H., Brantford.
Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.

NUTS, STEEL, CASTELLATED AND COLD PRESSED
Galt Machine Screw Co., Ltd., Galt, Ont.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Williams & Co., J. H., Brooklyn, N.Y.

NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Wilkinson & Kompass, Hamilton.

NUT BURRING AND NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.

NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Ltd., Montreal, Que.

NUT TAPPERS
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Hall & Son, J. H., Brantford, Ont.
Jardine & Co., A. B., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

OIL SEPARATORS
Can. Fairbanks-Morse Co., Montreal.

OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

OIL STONE GRINDERS
Oliver Machy. Co., Grand Rapids, Mich

OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.

OPENING DIE HEADS
Greenfield Tap & Die Corp, Greenfield.
Wells Bros. of Canada, Galt, Ont.

OPTICAL SUPPLIES
Consolidated Optical Co., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto.

OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
Brantford Oven & Rack Co., Brantford.

OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford.
MacKinnon Steel Co., Sherbrooke, Que.

OVENS FOR DRYING, TEMPER AND OXYGEN, ELECTROLYTIC CELLS UNDER TRUCKS
Welding & Supplies Co., Montreal, Que.
Brantford Oven & Rack Co., Brantford.

OXY-ACETYLENE WELDING AND CUTTING AND OUTFITS
Carter Welding Co., Toronto, Ont.
Prest-o-Lite Co., Inc. Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

PACKINGS, ASBESTOS
Cleveland Wire Spring Co., Cleveland.

PACKINGS, LEATHER, HYDRAULICS, ETC.
Graton & Knight Mfg. Co., Worcester, M.
Perrin, Ltd., William, Toronto.

PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.

PAPER MILL CONVEYORS AND DRIVES
Bertrams, Ltd., Edinburgh, Scotland.
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

PARTITIONS, WIRE
See Guards

PAPER MILL MACHINERY
Garlock-Walker Machinery Co., Toronto.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PATTERN MAKERS' LATHES
See Lathes.

PATENT SOLICITORS
Budden, Hanbury A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Wilson & Co., J. C., Belleville, Ont.
Greenleafs, Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

PECK CARRIERS FOR POWER PLANTS
Can. Link-Belt Co., Toronto, Ont.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton

PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PINS, TAPER
Morrow Screw & Nut Co., J., Ingersoll, Ont

PINS, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids.

PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph.

PIPE CUTTING AND THREADING MACHINES
Butterfield & Co., Rock Island, Que.

Electric Furnaces and Equipment

THURY REGULATORS, NEW TYPE

ELECTRODE WINCHES

ELECTRODE HOLDERS

MAGNETIC BREAKS

ROOF COOLER RINGS

HAND CONTROLS

BUSS BARS SYSTEMS

ELECTRIC FURNACES

FOR SMELTING FERRO ALLOYS AND REFINING STEEL

PORTABLE ELECTRIC HOISTS,

MONO RAIL HOISTS,

GENERAL CONSULTING

VOLTA MANUFACTURING CO.

WELLAND, ONTARIO

Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn
Jno Macdonald Co., Jamestown, Man.
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield
Hall & Sons, John H., Brantford.
Jardine & Co., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
McDougall Co., R., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
Williams Machy Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PHOTOSTATS.

Commercial Camera Co., Providence, R I

PIPE RIVETED STEEL

Toronto Iron Works, Ltd., Toronto.

PIERCING

Oliver Machy Co., Grand Rapids, Mich

PIPE CUTTERS, ROLLING

Curtis & Curtis Co., Bridgeport, Conn.
Greenfield Tap & Die Corp., Greenfield.
Hall & Sons, Ltd., John H., Brantford
Wells Bros. Co. of Canada, Galt, Ont

PIPE TOOLS AND DIES

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada Galt, Ont.

PIPE CUTTERS AND REAMERS

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada Galt, Ont.

PIPE STOCKS AND THREADERS

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada Galt, Ont.

PIPE TAPS AND VISES

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada Galt, Ont.

PIPE WRENCHES

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PISTON RODS, ROUGH TURNED

General Steel Co., Milwaukee, Wis

PISTON AND PISTON RING MACHINES

National Acme Co., Windsor, Vt.

PLANER BOLTS

Morrow Screw & Nut Co., J., Ingersoll, Ont

PLANER JACKS

Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY

Betts Machine Co., Rochester, N.Y.
Bertram & Sons Co., John, Dundas.
Oliver Machy. Co., Grand Rapids, Mich.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal
Foss Mchy & Supply Co., G. F., Montreal.
Gardner & Son, Robt., Montreal.
Garlock Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

PLANING AND SHAPING MACHINERY

Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal
Foss Mchy & Supply Co., G. F., Montreal
Garlock Walker Machinery Co., Toronto
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
Williams Machy Co., A. R., Toronto
Williams & Wilson, Ltd., Montreal Que

PLANER-SHAPER, COMBINED OPEN SIDE

Lynd-Farquhar Co., Boston
Williams & Wilson, Ltd., Montreal, Que

POWER HAMMERS

Quickwork Co., St. Marys, Ohio

PLANING MILL EXHAUSTERS

Can. Blower & Forge Co., Kitchener, Ont.
MacKinnon & Co., Montreal, Que.
Niles-Bement-Pond Co., New York

PLIERS

Aikenhead Hardware Co., Toronto.
Can. Hoffman & Steven, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Ct.
Rice Lewis & Son, Toronto, Ont.

PNEUMATIC TOOLS

Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co., Can., Toronto
Curtis Pneumatic Machy. Co., St. Louis
Garlock Walker Machy. Co., Toronto.
Int. Mach. & Supply Co., Ltd., Montreal
Independent Pneumatic Tool Co., Chicago.

POWER CRANES, HAND

MacKinnon Steel Co., Sherbrooke, Que.

POLISHING MACHINES

Ford-Smith Machine Co., Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

POLISHING PLATES

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

POWER HOUSE CONVEYORS

Can. Link-Belt Co., Toronto, Ont.
Mead-Morrison Mfg. Co., Boston, Mass.
Morse Chain & Hoist Co., Ltd., Herbert
Niagara Falls, Ont.

POWER TRANSMISSION MCHY.

Williams & Wilson, Ltd., Montreal, Que.

PRESSED STEEL PARTS

Gray Ball Bearing Co., Ltd., Toronto.

PRESSERS, ARBOR

Atlas Press Co., Kalamazoo, Mich
Metalwood Mfg. Co., Detroit, Mich
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BROACHING, FORGING AND FLANGING

Atlas Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
Metalwood Mfg. Co., Detroit, Mich
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, CAM, TOGGLE, EYELET

Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, FILTER

Perrin, Ltd., William R., Toronto.
Smalley-General Co., Inc., Bay City, Mich.

PRESSES, PNEUMATIC

Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, DROP AND FORGING

Banfield & Son, W. H., Toronto
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs Co, Ltd., Hamilton.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York
Perrin, Ltd., William R., Toronto
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co, Toledo.
Williams & Wilson, Ltd., Montreal Que

PRESSES, HYDRAULIC

Bertram & Sons Co., John, Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Standard Machy. & Supplies, Montreal.
West Tire Setter Co., Rochester, N.Y.
Williams Machy Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING

Perrin, Ltd., William R., Toronto.

PRESSES, POWER

Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich
Garlock-Walker Machinery Co., Toronto
Perrin, Ltd., William R., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT

Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SCREW

Barnes & Co., W. F. & Jno., Rockford, Ill
Bliss Co., E. W., Brooklyn, N.Y.
Perrin, Ltd., William R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, TRIMMING

Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PROPELLERS

Kennedy & Sons, Wm., Owen Sound

PSYCROMETERS, SLING

Taylor Instrument Co., Rochester, N.Y.

PULLEYS

Algoma Steel Corp., Sault Ste. Marie, Ont
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence
Can. Fairbanks-Morse Co., Montreal
Ford-Smith Machine Co., Hamilton, Ont.
Kennedy & Sons, Ltd., W., Owen Sound.
Positive Clutch & Pulley Works Ltd., Toronto.
Standard Mach. & Supplies, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PULLEYS, STEEL SASH, STEEL BELT

American Pulley Co., Philadelphia, Pa

PULLEYS, FRICTION, CLUTCH

American Pulley Co., Philadelphia, Pa.
Brown & Sharpe Mfg. Co., Providence
Canada Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Q
Can. Link-Belt Co., Toronto, Ont.
Cleveland Tramway Supply Co., Cleveland, O.
Cushman Chuck Co., Manchester, Ct.
Positive Clutch & Pulley Works, Toronto
Jones & Glassco, Montreal.
Williams & Wilson, Ltd., Montreal, Que.

PULP MILL MACHINERY

MacKinnon Steel Co., Sherbrooke, Que.

PUMPS, CENTRIFUGAL

Bowser & Co., Inc., S. F., Toronto.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
Darling Bros., Ltd., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

PUMPS, FUEL OIL

Bowser & Co., Inc., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
Trahern Pump Co., Rockford, Ill.

PUMPS, GEARED

Darling Bros., Ltd., Montreal, Que.

PUMPS, HIGH PRESSURE

Perrin, Ltd., William R., Toronto.

PUMPS, HYDRAULIC

Garlock-Walker Machinery Co., Toronto.
Darling Bros., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., William R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PUMPS, LUBRICATING, OIL STORAGE

Bowser & Co., Inc., S. F., Fort Wayne.

PUMPS, RUBBER CEMENT

Bowser & Co., Inc., S. F., Fort Wayne.

PUMPS, KEROSENE, OIL, SELF MEASURING

Bowser & Co., Inc., S. F., Fort Wayne.

PUMPS, LUBRICANT, OIL, WATER

Darling Bros., Ltd., Montreal, Que.
Fry's (London), Ltd., London, England.
Trahern Pump Co., Rockford, Ill.

PUMPS, SUD

Fry's (London), Ltd., London, England.

PUMP LEATHERS

Graton & Knight Mfg. Co., Worcester.

PUNCHES AND DIES

Atkins & Co., Ltd., Wm., Sheffield, Eng.
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co, Brooklyn, N.Y.
Boker & Co., Inc., H, Montreal, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner & Son, Robert, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Marshall, Son & Blunney, Toronto.
Marten Machine Co., Hamilton, Ont.
Peck, Stow & Wilcox Co., Southington, Ct.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Ltd., Montreal, Que.

PUNCHES, HAND

Peck, Stow & Wilcox Co., Southington, Ct.

PUNCHES, POWER

John Bertram & Sons Co., Dundas, Ont
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd, Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto.
A. B. Jardine & Co., Hespeler, Ont.
Long & Allstatter, Hamilton, Ohio
Niles-Bement-Pond Co., New York
D. H. Stoll Co., Buffalo, N.Y.
Wickes Bros., Saginaw, Mich.
Williams & Wilson, Ltd., Montreal, Que.

PUNCHING MACHINES, HORIZONTAL

Bertrams, Ltd., Edinburgh, Scotland.
Bertrams & Sons, John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co, Ltd., Hamilton, Ont.
Garlock-Walker Machy. Co., Toronto.
Niles-Bement-Pond Co., New York.
Wickes Bros., Saginaw, Mich.
Williams & Wilson, Ltd., Montreal, Que.

PYROMETERS

Bristol Co., Waterbury, Conn
Shore Instrument & Mfg. Co., New York.
Taylor Instrument Co., Rochester, N.Y.

QUARTERING MACHINES

Bertram & Sons, John, Dundas, Ont.
Niles-Bement-Pond Co., New York.

RAIL BENDERS

Algoma Steel Corp., Sault Ste. Marie, O.
Niles-Bement-Pond Co., New York.

RAILROAD TOOLS

Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto.
Niles-Bement-Pond Co., New York
Williams & Wilson, Ltd., Montreal, Que.

RASPS

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto
John Morrow Screw & Nut Co., Ingersoll.

RATCHETS

Atkins & Co., Ltd., Wm., Sheffield, Eng
Keystone Mfg Co., Buffalo, N.Y
Marshall, Son & Bunney, Toronto.

RAWHIDE PINIONS (See Gears)

REAMERS, ADJUSTABLE

Can. Fairbanks-Morse Co., Montreal
Cleveland Twist Drill Co., Cleveland.
Greenfield Tap & Die Corp., Greenfield.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
The Kelly Reamer Co., Cleveland, O.
J. A. M. Taylor, 318 Stair Bldg., Toronto.
Standard Mach. & Supplies, Montreal.
Wells Bros. of Can., Galt, Ont
Whitman & Barnes Co., St. Catharines.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Aikenhead Hardware Co., Toronto.
W. Boker & Co., Inc., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont
Whitman & Barnes Mfg Co., Akron, O.

REAMERS, STEEL, TAPER AND SELF-FEEDING

Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont
Whitman & Barnes Mfg. Co., Akron, O.

REAMERS, CHUCKING

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Greenfield Tap & Die Corp., Greenfield
Marshall, Son & Bunney, Toronto.
J. Morrow Screw & Nut Co., Ingersoll, Ont.
Wells Bros. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

REAMERS, HAND

Greenfield Tap & Die Corp., Greenfield.
J. Morrow Screw & Nut Co., Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont
Whitman & Barnes Mfg. Co., Akron, O.

REAMERS, PIN

Greenfield Tap & Die Corp., Greenfield.
Morrow Screw & Nut Co., John, Ingersoll.
Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

REAMER FLUTING MACHINES

Garvin Machine Co., New York.

REAMING MACHINES, PNEUMATIC

Cleveland Pneumatic Co. of Can., Toronto
Garlock-Walker Machinery Co., Toronto.

RECORDING INTRUMENTS

Bristol Co., Waterbury, Conn.
Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REELS, WIRE AND TEXTILE MFG.

American Pulley Co., Philadelphia, Pa.

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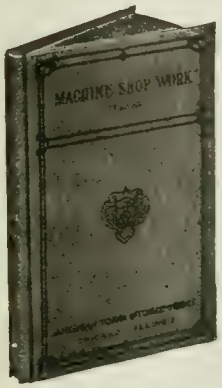
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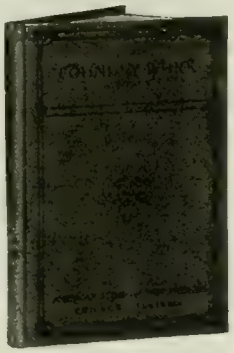
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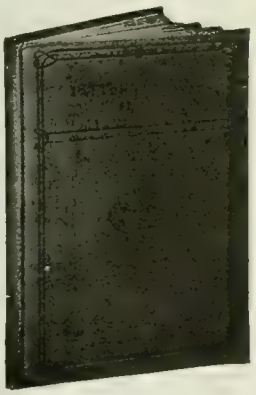
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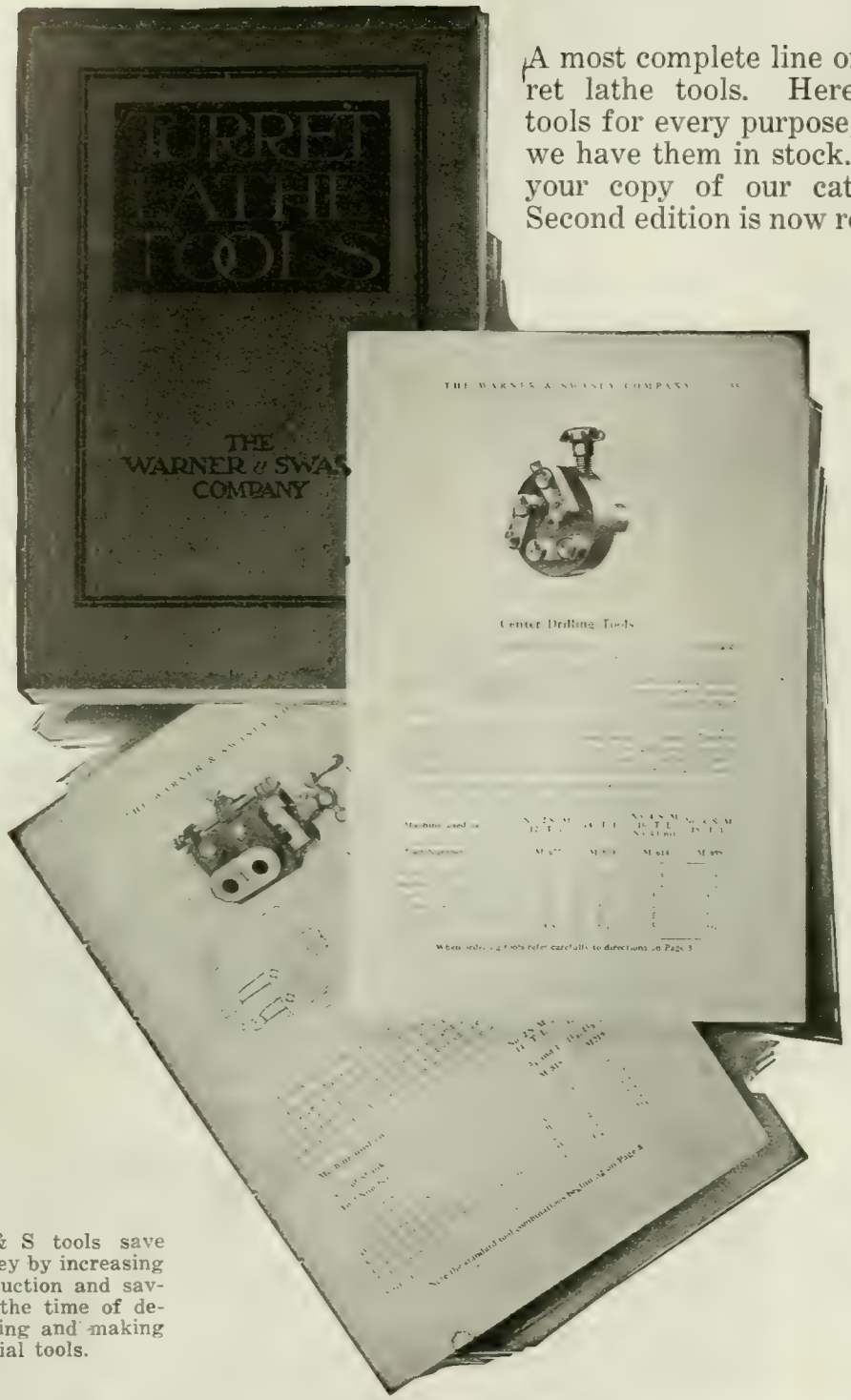
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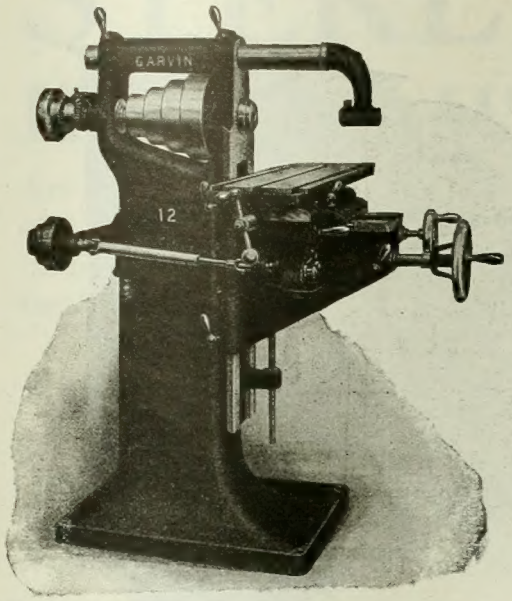
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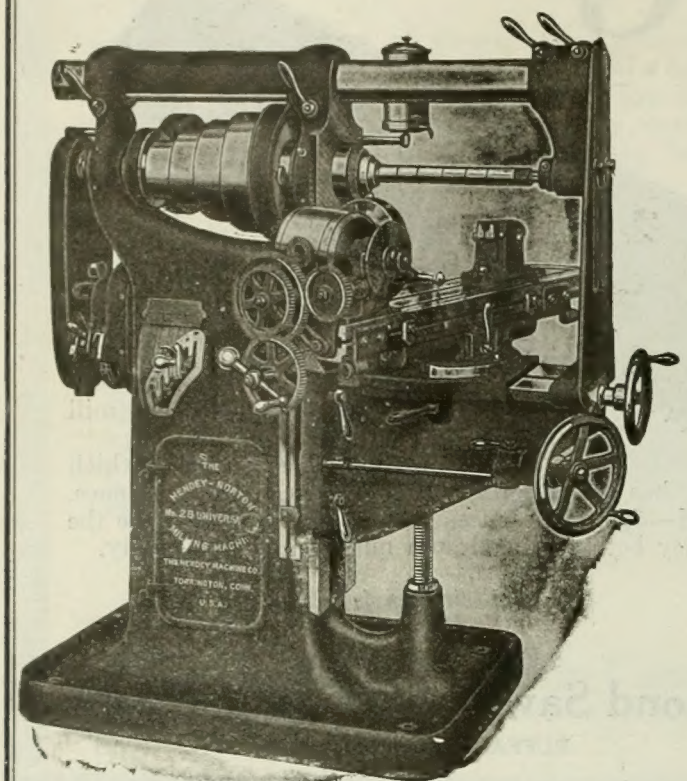
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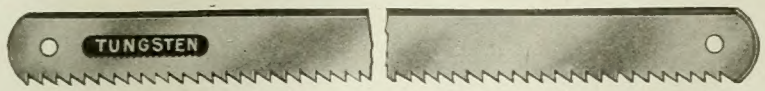
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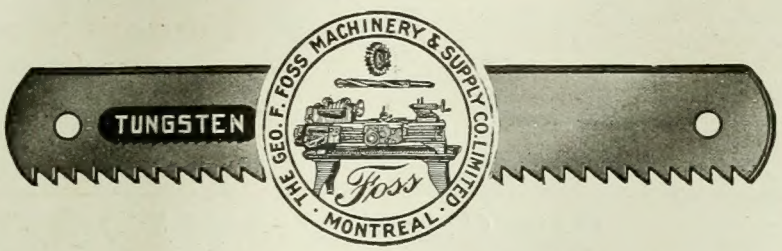
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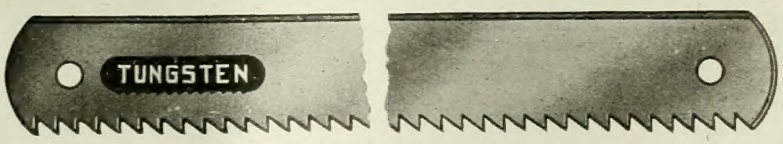
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McARTHUR BELTINGS
CHAMPION TOOLS
SWEETLAND CHUCKS
SMITH & MILLS' SHAPERS AND MANY OTHERS

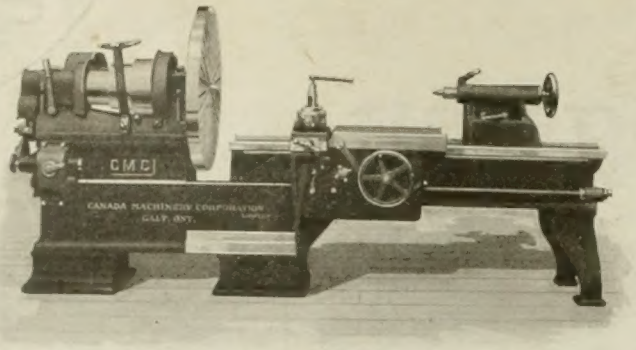
We'll be glad to send you full particulars on any line or lines in which you are interested.

The Geo. F. Foss Machinery & Supply Co., Limited

305 St. James Street Montreal, Que.

No. 111

QUALITY Foss SERVICE



18-in. Gap Lathe with plain gears

C.M.C.

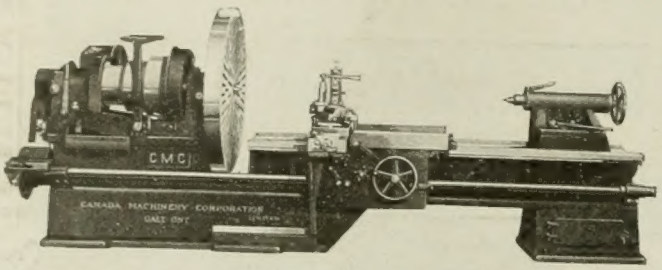
GAP LATHES

The Lathe for all round Service

HOW THEY COME

Sizes 18-in. to 32-in. with quick change gears.
Sizes 18-in. to 36-in. with plain gears.
All sizes with cone drive.
All sizes with motor drive.
All sizes with all geared head.

Further details upon request.



26-in. Gap Lathe with quick change gears

CANADA MACHINERY CORPORATION LIMITED

GALT - - - - - - ONTARIO

Toronto Office and Warerooms: Brock Avenue Subway

36-in. all geared head, motor driven Gap Lathe

